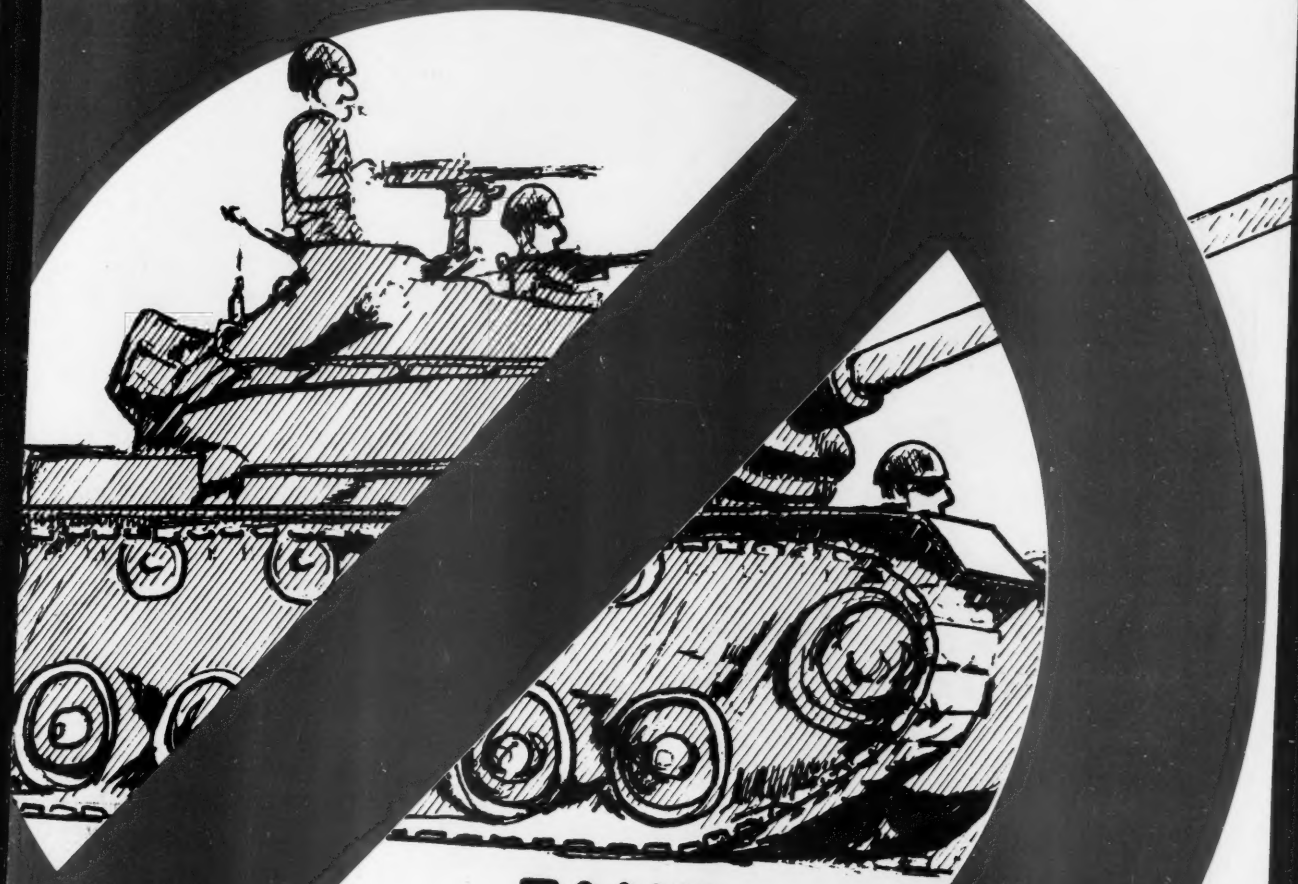
UNITED STATES ARMY
AVIATION DIGEST
JUNE 1985



TANK BUSTERS

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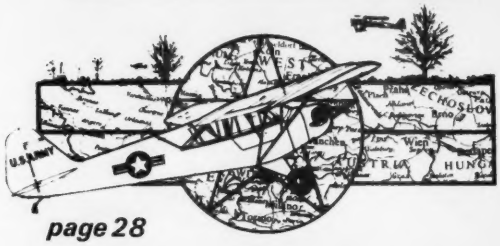
U.S. ARMY AVIATION'S 43d Birthday



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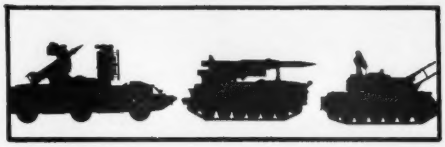

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Honorable John O. Marsh Jr.,
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Commander, U.S. Army Aviation Center

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Editor

The mission of the *U.S. Army Aviation Digest* (USPS 415-350) is to provide information of an operational, functional nature concerning safety and aircraft accident prevention, training, maintenance, operations, research and development, Aviation medicine and other related data.

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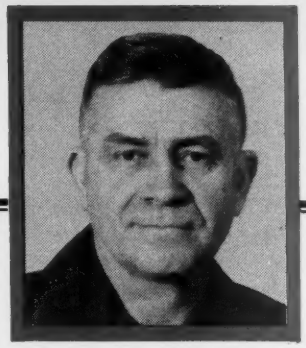
Major General Ellis D. Parker
Chief, Army Aviation Branch



AVIATION EXCELLENCE

AVIATION EXCELLENCE is a new Aviation Center program directed at gaining the maximum benefits from Aviation test and evaluation assets. The idea is to expand from our traditional specific focus on materiel acquisition and provide test and evaluation support for doctrine, force design and training.

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Mr. Edward J. Bavaro
Threat Branch
Directorate of Combat Developments
U.S. Army Aviation Center
Fort Rucker, AL

TANK BUSTERS

"Just as tanks have always been the most effective weapon against tanks, so helicopters are the most effective means of fighting helicopters."
Major General Belov

Major General Belov's contention that the tank is the best means of combating tanks has been cited again and again. But are tanks* really *the best means of fighting tanks? Let's look at the facts.

DURING WORLD WAR II, several aircraft won renown for their ability to kill tanks. In the early days of the war, the German Junkers 87 STURZKAMPFFHUGZEUGE Stuka dive bomber helped clear a path for the German ground forces through Poland and, subsequently, the Low Countries and France to the English Channel. At that time, it was the best example of the prudent application of air support to ground forces and played a major role in making the German Blitzkrieg so effective. In the action against Poland, the Stuka was the outstanding success of the campaign, paving the way for the German advance into Poland.

In the Western Campaign, the Stuka again played an important role, particularly in the risky thrust through France to the English Channel. The German Army had decided to drive a powerful armored wedge 200 miles long between the northern and the southern groups of armies defending France. If German tanks were ever separated from their supporting infantry and their supplies, then the naked German armor forces would have been in real trouble. The Luftwaffe kept Allied airfields under duress while the dive bombers prepared the way for the tanks. The Stukas were employed against points of resistance (identified by air and ground reconnaissance) that could impede their armored advance. These aircraft flew as many as nine sorties per day, paralyzing all British and French attempts to stem the flow. The Stuka legend was growing.

The JU-87, first produced in 1937, was of all-metal construction with a greenhouse canopy, typical of that era, for a crew of two. The inverted gull wings were unique but were so configured to reduce the length of the fixed, heavily skirted main landing gear. The most horrific feature of the Stuka was the unnerving howl caused by the piercing whine of the propellers turning at high revolutions during bombing dives. Taking note of the psychological effect this noise had on the Poles, the Germans added a siren, attached to the starboard undercarriage, which greatly accentuated the frightening effect overall. This banshee effect was given the nickname of the "Jericho Trumpet."

During the Western Campaign, the Stuka's 20 millimeter (mm) cannons effectively chewed up the lightly armored tanks of the French and British. Ordnance delivery was highly accurate because of the exceptionally steep dive angles the Stuka attained, which greatly reduced the slant range error.

On the Russian front, the emergence of the rugged T-34 medium tank caused the Germans to upgrade their cannons on the Stuka. The tough T-34 proved to be too well armored for the 20 mm cannons; consequently, the Germans mounted 37 mm cannons in pods under the wings.

German JU-87 Stukas during the Western Campaign — the original "Tank Busters."

The most famous Stuka pilot, Hans Rudel, made effective use of these weapons. He is said to have destroyed enough Russian tanks to equip an armored division. When the tanks were attacked, the German pilots aimed their tungsten-cored 37 mm cannon shells at the sides and rear sections where the armor was the thinnest. For his success, Rudel received the highest decoration awarded a German aviator in World War II.

The Stuka was regaining fame it had lost during the Battle of Britain and now the Germans nicknamed the Stuka—"Tank Buster."

As successful as the Stuka was, however, it did have its disadvantages. The Stuka had to have protection. Without fighter aircraft protection, the Stuka was a sitting duck to any fighter aircraft that went up against it, as happened during the Battle of Britain. On the Russian front, the attrition of the German Luftwaffe and the growing strength of the Red air force progressed to the point that by July of 1943, the Germans were unable to establish any real air superiority. With the weakening of the German ground forces, the participation of Luftwaffe antitank aircraft was an absolute necessity. Thus the Stuka and the newer Henschel 129B aircraft were pressed into impossible and futile situations and suffered inordinate losses as a result.

TANK BUSTERS

ABOVE: A Russian IL-2 Shturmovik moving out of the chocks.

RIGHT: Russian T-72s moving forward during exercise with air defense protection provided by ZSU-23-4s and combat air support provided by Mi-24 Hinds.

On the Russian side, they possessed the most incomparable ground attack aircraft of the war. No other country possessed as fine a ground attack aircraft as the Russian IL-2—"the Shturmovik." While some aircraft could conduct certain aspects of the ground attack roles better than the Shturmovik (e.g., the Stuka antitank capability), none could match its overall ability. It started a tradition in the Soviet military that continues today as one of the finer facets of their offensive operations.

In its day, the outstanding teamwork of the Shturmovik in partnership with the T-34 was described by Stalin as his "hammer and anvil."* To factory workers building the IL-2, Stalin said in December 1941 that, "IL-2 was as essential to the Red Army as air and bread." This aircraft was well protected with armor for its vital areas such as the engine, radiator, oil cooler, fuel tanks and crew. The armor plating totaled 1,540 pounds—15 percent of the total loaded weight of the aircraft (the Hind has nearly a *ton* of armor plating).

In the early days of the war, its ordnance suite included two 20 mm cannons that had higher muzzle velocity and greater explosive power than other 20 mm cannons. By 1943, these were changed to 37 mm to counter the newer, more heavily armored German Panzers. These cannons and a new special cumulative-action antitank bomb accounted for many of the German tanks in the fighting in the Kursk salient. The Soviets frequently sought out opposing armor in their concentration areas. By engaging them at that stage, they knocked out large numbers of tanks, preventing the Germans from mounting intended attacks.

The Shturmoviks were a different proposition from the Stukas; the latter needed substantial protection and cover from fighter aircraft. The IL-2s were durable and tough, able to take punishment while at the same time being nimble enough at low altitudes to give a good account of themselves in aerial engagements. The IL-2 proved the value of rockets for use in ground support roles. Close air support really represented the major advancement in aviation combat that the Soviets made during the war. Aerial tank busting of that era depended on having at least air parity if success was to be achieved.

Since World War II, only the Soviets have maintained an active commitment to ground support aircraft. For our part, the advent of jet propelled aircraft led to the development of air superiority fighters and swift interceptors. The combat air support (CAS) requirement to U.S. ground forces, in the meantime, was only receiving lip service. The French recognized the need to beef up the antiarmor capability of their ground forces. They saw the tank-heavy battlefield of the next war in Europe as being weighed in favor of the Soviet Bloc with their marked numerical superiority in armored forces. The French felt the long-ranged, antitank guided missiles provided a reasonable means to counter the armor imbalance if the exchange ratio (tank versus helicopter) approximated expectations.

*Today, the Soviets are re-creating the "hammer and anvil" success of the IL-2 and T-34 tanks with the Hind attack helicopter and the T-64/72/80 main battle tanks. Many recent Soviet exercises have featured massed tanks and attack helicopters in coordinated and decisive thrusts and deep penetrations.

Helicopter armament became a major undertaking for the U.S. Army from the late 1950s onward. The overwhelming threat to the North Atlantic Treaty Organization (NATO), because of the disparity in tank forces between the Warsaw Pact and NATO, required that careful attention be addressed to antitank resources and armament. The United States has always been the leading advocate in the development of the antitank attack helicopter among Western nations.

Undoubtedly the development of our antiarmor systems was diluted during the Vietnam War years. In the closing years of our Vietnam involvement, we experienced an increase in antiaircraft activity (of limited sophistication) and enemy armor on the battlefield. During the Vietnam War, the new TOW missile was mounted on UH-1C Huey helicopters that successfully engaged Russian-made tanks employed by the North Vietnamese. But this type of engagement was the exception rather than the rule. Most attack missions flown by our attack helicopters dealt with antipersonnel, ground support roles. It was the Mideast War of 1973 that jolted us back on track.

The reality of the *problems* of operating helicopters in a high-intensity threat environment was adequately demonstrated in that short, intense conflict. Fortunately, a few perceptive individuals articulated the *opportunities* for attack helicopters operating on such a target-rich battlefield. Today, the Cobra, the Apache, the Hind, the Havoc and the follow-on attack helicopters belie MG Belov's contention that the tank is the best means of combating tanks. These tank busters can do the job at least as well as the Stuka or Shturmovik. And some of them can do it at night and in adverse weather conditions that would have rendered those World War II stalwarts pretty useless.

The level of technology being applied to attack helicopters today is remarkable. This technology includes day and night target acquisition systems that can detect, recognize and engage enemy targets during periods of limited visibility. The sensors include high resolution television and telescopic systems effective in daylight contained in an electro-optics package and thermal imaging systems such as forward looking infrared that can track targets at night through conditions that would otherwise be

visually obscured. Add to that the capability to selectively point your sensors and guns by simply moving your head, with an integrated helmet sight, and you speed up the target acquisition process. Throw in fire and forget missiles with good standoff range, fired from platforms generally outside the operating envelopes of most air defense systems, and then perhaps Belov would qualify his often quoted pronouncement.

Even if he does not recognize this obvious fact, rest assured that other, more prominent Soviet movers and shakers have. Can there be any other reason for the Soviet effort to improve the low altitude effectiveness of their air defense systems and their growing emphasis on antihelicopter capability for their attack helicopters?

The Soviets intend to protect their tanks. Tank-heavy forces are essential for the successful execution of a resolute offensive conducted at a high tempo to great depths. Concern for the enemy antitank threat is the dominating factor in coordinating the combined arms effort. Priority of fires will go toward countering antiarmor systems. Artillery is most effective against ground antiarmor teams.

Antiarmor attack helicopters are another proposition, however. These modern tank busters, employing highly accurate missiles, can engage enemy tanks from standoff ranges that would allow for several sorties (and increasing attrition) before the Soviet forces close with NATO ground forces. The advance could be slowed or delayed at chokepoints or attrited enough to cause preemptive commitment of the second echelon. In either case, NATO forces will have acquired a most valuable commodity—time. A better prepared defense could be organized.

The Soviets, you can bet, are aware of the need to take the sting out of our attack helicopters. They have recognized that necessity for some time now. Back in 1976, LTG Reznichenko in an article printed in the Soviet army paper *Red Star* detailed the superiority of the helicopter in antiarmor roles. Even before that, Colonel General Mishuk listed the priorities for future air combat forces objectives as:

- Combating tanks with helicopters
- Combating CAS aircraft and helicopters

Today, the Soviets are fully cognizant of the favorable exchange ratios for helicopters in helicopter versus tanks exercises, from both their tests and ours. Those kinds of tank losses (as much as 19 to 1) are unthinkable.

The Soviets will spare no effort trying to defang our attack helicopters and nothing does it better than another *helicopter. This* is where Belov is right on the mark in the last part of his pronouncement that, "...helicopters are the most effective means of fighting helicopters."

Russian Mi-24 Hind-D firing an AT-2 Swatter ATGM.

VIEWS FROM READERS

Editor:

Doug was once my Aviation safety officer. He was the best that ever worked for me, and he was very serious about his duties. Doug was an Army warrant officer. He was not your home-boy athlete; he was just a little bit rotund by Army standards and some people joked about that. But he was a first-class safety officer, one of those fellows who always got out with the troops — shook a lot of hands, but kept his eyes open. Not a safety nut; a real rational guy. Doug was a gentleman who was liked and respected by his fellow professional aviators despite themselves, sometimes. He was my friend.

He was also an impeccable pilot. No short-cuts, by-the-book, no surprises. The kind of pilot that you would want your mother (or your commanding officer) to ride with.

Like many ambitious Army aviators, he aspired to fly the biggest and the best airplanes in the inventory. So we got him a special appointment to the desired transition school. Naturally, he graduated at the top of his class and was shortly reassigned overseas.

I saw a newspaper picture of my good friend dying. His helicopter was literally falling apart—but I could see (and I could imagine) that he was still trying to fly that doomed thing and save his passengers.

Men of great courage (try to) do the best that they can until the very last moment.

Forty-five men and Doug died in that accident—not in the slightest because of any lack in his expert flying ability—for he had no lack.

He exemplified the highest traditions of the Army aviator, past, present and future, and it is my great honor to render Doug a salute.

Charles W. Abbey
LTC, U.S. Army, Retired

Golden Knights Accepting Applications

The United States Army Parachute Team, the "Golden Knights," are accepting applications from service members who are interested in trying out to become a member of the team fo he 1986 demonstration/competition season.

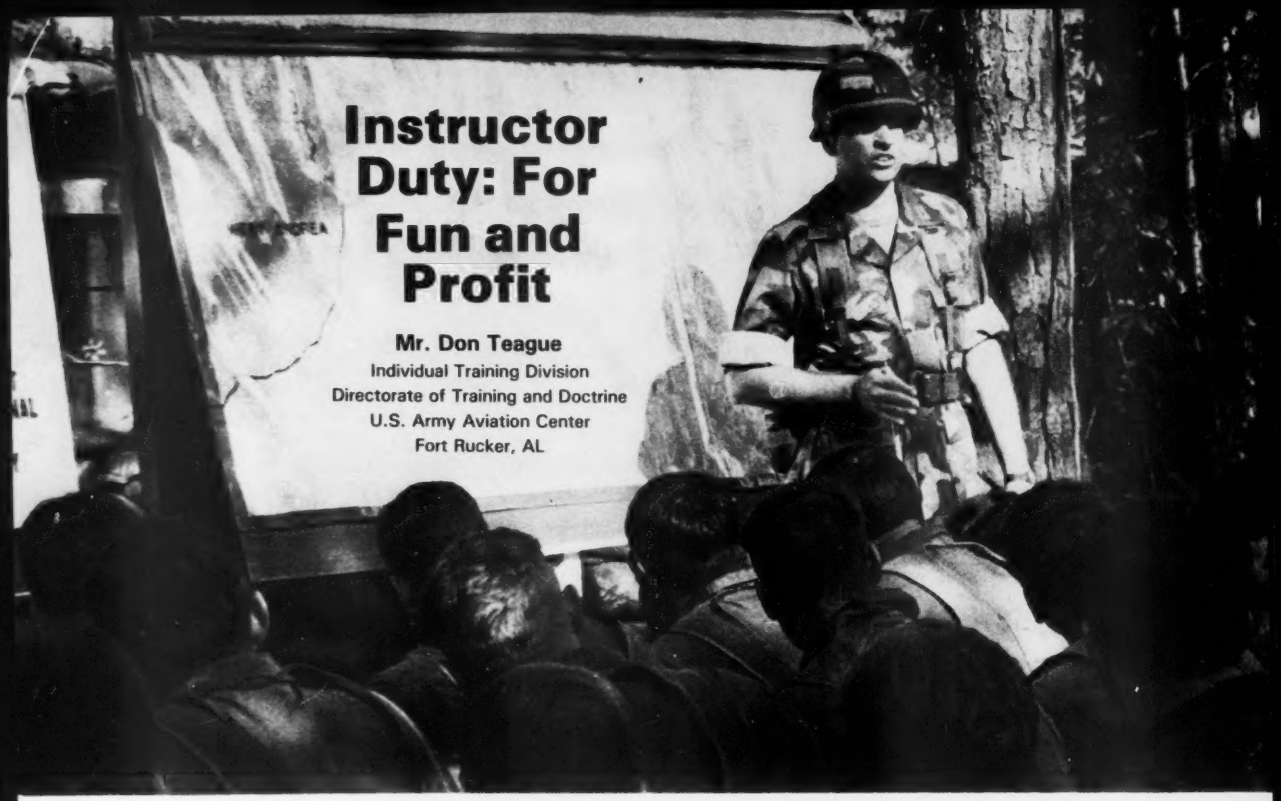
The "Golden Knights," the Army's only official aerial demonstration unit, are based at Ft. Bragg, NC. They have performed more than 300 live demonstrations throughout the United States before an estimated audience of 10 million spectators each year.

The following requirements must be met before requesting selection to the tryout program. Service members must be active duty men or women in grades E1 through E7, have at least 150 freefall jumps and be actively jumping a ram-air (square) canopy. They must have at least 2 years remaining on their current enlistment or be willing to reenlist or extend if accepted on the team. Applicants also must have a clean military record, no court martials, Article 15s or bars from reenlistment, and must not be on orders or alerted for overseas service. Service members already serving tours overseas must have completed 5/6th of their obligated tour by 31 December 1985.

This year's tryout program is tentatively scheduled from 1 October to 11 November 1985. Interested individuals may request tryout applications by writing to the U.S. Army Parachute Team, "Golden Knights," ATTN: Tryout NCOIC, P.O. Box 70126, Ft. Bragg, NC 28307-0126 or by calling AUTOVON 236-4800/4828 or Commercial (919) 396-4800/4828. All applications must be completed and received no later than 30 July 1985.

If selected for the tryout program, service members will either be placed in a temporary duty or special duty status with the Army Parachute Team.

Articles from the Aviation Digest requested in these letters have been mailed. Readers can obtain copies of material printed in any issue by writing to: Editor, U.S. Army Aviation Digest, P.O. Box 699, Ft. Rucker, AL 36362-5000.



Instructor Duty: For Fun and Profit

Mr. Don Teague
Individual Training Division
Directorate of Training and Doctrine
U.S. Army Aviation Center
Fort Rucker, AL

This article should prove interesting to all instructor pilots, standardization instructor pilots and their supervisors/commanders worldwide. The teaching and learning situations discussed here also are applicable to air traffic control, maintenance and other instructional areas in varying degrees.

CAPTAIN WILL RISKIT is downcast, chagrined, vexed and generally in a blue funk. He has just found out he's to be assigned as an instructor at the Army Aviation Center, Ft. Rucker, AL. Oh, woe! Oh, grief! He thinks, "I've survived a thunderstorm on partial-panel, a tornado in a hang glider, my mother-in-law's cooking—but I won't last through the next 3 years."

Be of good cheer, sir! Teaching can be the most challenging and rewarding, satisfying and stimulating duty you've ever had! As with many other aspects of life in general and military service in particular, much depends on the attitudes, perceptions and understandings one develops while in the training environment. To this point in your Army career you've devoted yourself to being "all that you can be." Undoubtedly your thoughts are already turning toward the idea that, "If teaching is gonna be my job for the next few years, then by gosh, I'm gonna be the best they've ever seen!"

Bully for you, sir! Just don't forget that your students, too, are trying to do more than just hang in there. They, too, want to excel in training and in the Army. And, for better or worse, you are their role model in excellence. Their observations and perceptions of the way you interact with them, your peers, supervisors and subordinates, and the way you cope with your own pressures, may strongly influence their behavior for many years. Whether you're on your way to an instructor slot or 18 months into it; whether you're a worker bee or a supervisor; whether it's air traffic control school or flight school, academics or hands-on; a review of some basic concepts may help both you and your students get the most from your teaching.

The only reason for the existence of the training environment is people; people are its input, people are its output. The only observable, measurable product of the training process is a change (hopefully an improvement) in the performance of those people (hereinafter called stu-

dents). The most influential, the most critical, the most dominant factor in both the quality and quantity of that change is the instructor. The quantity of that change is a direct reflection of instructional technique; the quality is a direct reflection of instructional attitude. These are the immediate and overriding responsibilities of the individual instructor. The instructional techniques applied, and attitudes demonstrated, must be of the highest order so as to deliver the most highly developed product possible.

Instructors must create a rewarding learning atmosphere, not a punishing one. Students must be led to positive, not negative feelings about themselves. Instructors must never forget that, though the skills and knowledges to be trained may be very old stuff to them, they are brand new to the students and can be very difficult and confusing. One of the marks of the professional instructor is the ability to correct students' performance without degrading them. Loud, cursing, insulting behavior toward the student has no place in a professional instructional environment. A gentleman named Premack, highly regarded in the psychology profession, once stated a principle of behavior that, though obvious, is sometimes forgotten by instructors: "Behavior (performance) that is followed by pleasant consequences (praise) will be repeated."

Never forget that the students *want to please* the instructors. The instructors must not allow themselves to fall into the pattern of saying nothing when students perform well or correctly, interacting with students only when performance is below standard, and then with raised voice and harsh tones. It is the instructor's responsibility to ensure that the student gets the positive strokes required for a positive self-image.

In times of stress, such as examination, a positive self-image may mean the difference between passing and failing. Nothing destroys the effects of a reward (praise) quicker than a dose of punishment (harsh, degrading criticism). Praise coupled with constructive, intelligent, professional corrective instruction reinforces students' positive self-image, increases their confidence and makes learning an enjoyable challenge.

Though one's instructional attitude is closely linked to one's instructional technique, and each usually reflects the other, they are separate components of instructional performance. The way the instructor perceives the student and his or her relationships to that student are significant factors of that instructor's attitude. The instructor who is newly graduated from an instructor training course usually brings an extremely positive attitude to the training environment:

- Students are seen as a challenge.
- Each one is different, an individual.
- Instructional techniques are adjusted to fit varying student needs.
- There is obvious concern for the students and their progress (or lack thereof). The instructor who can adhere to this basic instructional technique and maintain these attitudes from day to day, month in and month out, deserves the highest accolades.

What may occur with the passing weeks and months, however, happens in varying degrees and lengths of time, depending on the individual:

- All students begin to look alike.
- They are seen as a burden.
- They interfere with more desirable pursuits.
- They are to be tolerated, not nurtured.
- Since they make the same mistakes at the same point in training as their predecessors, the same instructional technique is applied to all.

These changes in instructional attitude are extremely detrimental to the learning process. They are symptoms of *instructor burnout.*

A decrease in an instructor's positive attitude is normally a slow, insidious deterioration that accelerates as it decreases. What is required first is considered another mark of the professional: a periodic self-assessment of attitude; an evaluation for which the individual must take responsibility. To avoid a prolonged, continued and harmful (to the instructor as well as the student) slide toward the netherworld of the uncaring, the instructor need but ask a few simple questions:

- Am I more concerned with myself than with the student?
- Am I teaching in a manner that will satisfy my needs rather than those of the student?
- Am I teaching the way that's easiest for me rather than best for the student?
- Am I teaching according to my

Instructor Duty
continued

experience with 100 students rather than this student's *one* experience with me?

- Am I using this student as a convenient outlet for my frustrations, impatience, fatigue, boredom, whatever?
- Am I molding this student or beating him or her into submission?

If the answer to any of these questions is "yes," one can assume that one's effectiveness as an instructor has decreased by a minimum of 10 percent for each such answer.

At the same time there usually will be an accompanying realization of some degree of discomfort with one's job. Do I:

- Feel drained, fatigued, overloaded?
- Feel that my work isn't appreciated?
- Feel helpless, powerless, trapped?
- Avoid tasks, procrastinate, miss suspenses?
- Complain and respond with "Yes, but.." when a suggestion is offered?
- Feel threatened?
- Overeat, drinking too much?
- Get inappropriately angry?
- Feel my needs are continually sacrificed for someone else?

Are these warning signs appearing in you? Continually? Getting more intense? In bunches? What do you do about it? What *can* you do about it?

There is a wide variety of remedies; choice depends on the individual. The first step is to admit the problem, keeping two things in mind: 1) Nearly every professional instructor encounters it, usually several times. 2) It's the student who is paying the price for your self-indulgence! The next step is to talk it over with your supervisor and work out a solution together. Your supervisor has dealt with this problem before and may already have begun to see the signs in you. Above all, don't ignore the problem. Recognize it for what it is—a natural fallout from giving your students the best of yourself, many hours a day, every day; a natural result of caring, sometimes too much. Your supervisor can help if given a chance.

What is an appropriate, professional, supervisory response to burnout? What can be done to help your instructors ease the pain? Can it be forestalled?

Just as good unit commanders are continually alert to signs of flight fatigue in their pilots, so too the supervisor must be alert to the manifestations of burnout. The indicators and the rate of the burnout process are specific to the individual instructor's characteristics and personality. You must know your instructors well. You are in a position to notice burnout symptoms before the individual does.

One of the forestalling actions you can take is to inform the newly assigned instructor that burnout is an occupational hazard. Another is to let instructors know that it's professionally acceptable for them to be concerned about their own psychological and emotional welfare—and to take care of themselves, as long as it's not at the expense of the student or the mission. This can be accomplished by helping them learn the warning signs of burnout.

You must be aware of the powerful influence of the group on individual behavior. Encourage instructors to take care of each other. Take a potential burnout victim away from it all by assigning a special project; a month of researching and writing training material, for example; designing a new training aid; attending a pertinent training course that will benefit the unit. Better still, encourage a couple of weeks leave. Give the instructor a chance to recharge those batteries that have run low!

Instructor duty can be extremely fulfilling, both professionally and personally. You will become (if you're not already) a bona fide expert in your area of instruction. As in flying or driving, you will get fast feedback on your performance and ability. You will watch an individual's skills and knowledge develop and flower as though in time-lapse photography. You will find yourself intimately responsible for a large portion of another's attitude and philosophy about *your* chosen profession.

Equally as important, you will learn or improve on some personal skills: how to communicate more effectively, how to better interact with a wide variety of personalities over a relatively short period, how to cope with a different sort of stress. Successful completion of a tour in a formal training environment firmly establishes your professional credentials. It can be a positive determinant throughout your Army career. In short, CPT Riskit, you will be entering what is merely a convenient setting where people can interact with other people for the purpose of improving performance; instructor people as well as student people. You can't ask for a better place to continue "being all that you can be." Try it—you'll like it!

GOAL—
$2,500,000
June 1985—
$1,550,000
cash and pledges

Army Aviation MUSEUM

This is a series about the Army Aviation Museum Foundation fund drive. Currently, plans call for building a modern complex to house your Army Aviation Museum. Since last month additional donations have been received. However, we still have a ways to go, as the barometer above shows. If you would like to help "build" the Army Aviation Museum's new home, you are invited to send a tax deductible contribution to: The Army Aviation Museum Foundation, Box 610, Ft. Rucker, AL 36362-5000. If you desire additional information call Mr. Ed Brown at (205) 598-2508.

A Look At What's In Your Museum

In August 1954, the Army obtained its first H-21 Shawnee, and by 1959 its inventory had increased to 308. On 21 November 1961, the *USNS Core* departed for Vietnam with its flight deck loaded with CH-21s sealed in cocoons. On 11 December 1961, the voyage ended in Saigon. One by one the H-21s flew from the deck (below left) down the Mekong River to Saigon International Airport. Joint operations training with the Vietnamese began on 22 December 1961. On 2 January 1962, 1,036 Vietnamese soldiers were flown into a "hole in the jungle." The mission was performed with great speed and success, causing a surprise capture of a considerable amount of enemy equipment and greatly impressing Vietnamese commanders.

PEARL'S

Personal Equipment And Rescue/survival Lowdown

Cheryl Shoemaker photo by WO1 Ken Collins

Army Western Region ALSE/Survival School (AWRASS)

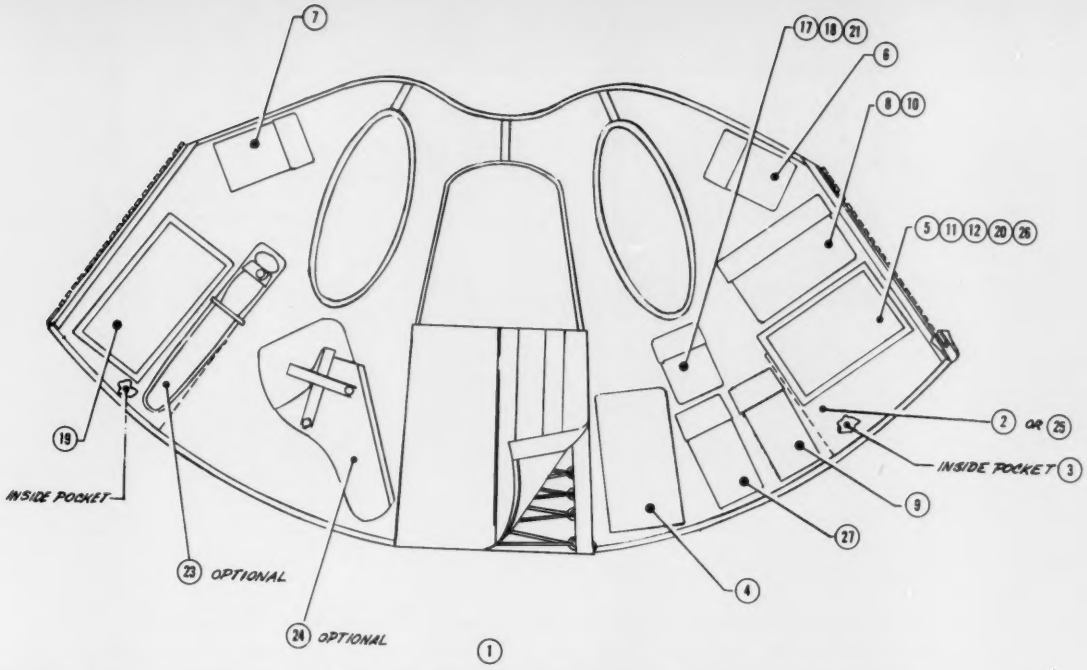
Since AR 95-17, the Army Aviation Life Support System Program was published last spring requiring commanders to "Ensure training of aircrew personnel in the proper operation, use and operator maintenance of survival equipment and the techniques of survival," more and more emphasis is being placed on the many different types of survival training. In anticipation of this training requirement, Sixth U.S. Army is sponsoring and the Oregon National Guard is hosting the Army Western Region ALSE/Survival School. The school is located just outside of Portland, OR, and satisfies all the survival training requirements providing the Aviation commander with various training options. The commander may choose to schedule all aircrew personnel through the 5-day course or limit attendance to just those personnel who will be used as unit survival trainers. Classes in basic land survival, cold weather survival, combat survival and ALSE refresher training have already been given this year. Other classes and their class dates are:

FY 85	
Hot Weather Survival	4-9 August 1985
ALSE Technician (Q2) (Open to NG and USAR personnel only)	11-31 August 1985
Hot Weather Survival	11-16 August 1985
Overwater Survival	8-13 September 1985
Overwater Survival	15-20 September 1985

FY 86 (Tentative)	
Basic Land Survival	20-25 October 1985
Basic Land Survival	27 October - 1 November 1985
Cold Weather Survival	5-10 January 1986
Cold Weather Survival	12-17 January 1986
Cold Weather Survival	9-14 February 1986
Cold Weather Survival	17-21 February 1986
Combat Survival	9-14 March 1986
Combat Survival	16-21 March 1986
Combat Survival	6-11 April 1986
Combat Survival	13-18 April 1986
ALSE Refresher	14-16 March 1986
ALSE Refresher	22-23 March 1986
ALSE Refresher	11-13 April 1986
ALSE Technician (Q2) (Open to NG and USAR personnel only)	1-20 June 1986
Combat Survival	8-13 June 1986
Combat Survival	15-20 June 1986
Hot Weather Survival	6-11 July 1986
Hot Weather Survival	13-18 July 1986
Hot Weather Survival	17-22 August 1986
Hot Weather Survival	24-29 August 1986
Basic Land Survival	7-12 September 1986
Basic Land Survival	14-19 September 1986

NOTE: These classes are subject to change without notice depending on class fill rates and unforeseen problems.

The AWRASS has been approved by Forces Command. Active Army, U.S. Army Reserve and National Guard personnel wishing to attend or commanders who want to send their personnel through this training should contact HQ Sixth U.S. Army, Aviation Division, Major Patrick Kelley, AUTOVON 586-4133/4102.



SRU-21/P Survival Vest Component List

1. Vest Contents, Assembly
2. Vest, Survival, Small or Large
3. Bag, Storage, Drinking Water, Size B
4. Signal Kit, Foliage Penetrating (Flares)
5. Survival Kit, Individual Tropical
6. Tourniquet, Nonpneumatic, Camouflage
7. Compass, Lensatic
8. Net, Gill Fishing
9. Knife, Pocket
10. Light Marker, Distress (Strobe Light)
11. Mirror, Emergency Signaling
12. Fire Starter, Aviation Survival, Magnesium
13. Assembly Instruction Sheet (Not Shown—Put in either inside pocket)
14. Deleted
15. Deleted
16. Deleted
17. Cartridge, Caliber .38 Ball
18. Cartridge, Caliber .38 Tracer
19. Radio, AN/PRC-90 (Pocket used will be NSN 8415-00-442-3616)
20. Blanket, Combat Casualty
21. Whistle, Ball, Plastic
22. Operator's Manual (Not Shown—Put in either inside pocket)
23. Optional item. Knife, Hunting, Sheathed. If issued, may be located as shown in this drawing alongside PRC-90 radio pocket (Item 19).
24. Optional item. Pistol Holster for .38 Caliber Pistol. Holster will be fitted to wearer as shown.
25. Vest, Survival, Large or Small
26. Insect Repellent, 1 ounce
27. Miscellaneous

SRU-21/P Survival Vest (Latest Configuration)

I refer you to the May 1984 issue of *Aviation Digest* showing the SRU-21/P survival vest and its component locations. Since that time there has been a relocation of some of the components due to their inaccessibility. Pictured here is the latest configuration and location of components. Point of contact at Natick Research and Development Center is Mr. Chuck Braga, AUTOVON 256-5449.

If you have a question about personal equipment or rescue/survival gear, write PEARL, AMC Project Officer, ATTN: AMCPO-ALSE, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798 or call AUTOVON 693-1218/9 or Commercial 314-263-1218/9.

MOHAWK EVASIVE MANEUVERS: The Rest of the Story

CW4 Theron O. Clark
Fixed Wing Standardization Pilot
Directorate of Evaluation and Standardization
U.S. Army Aviation Center
Fort Rucker, AL

A LONG TIME ago I arrived in the Republic of Vietnam on a tour flying the OV-1 Mohawk. Exactly 10 days after disembarking a DC-8 at Cam Ranh Bay, I found myself flying side looking airborne radar missions off the coast of North Vietnam on what was then called "Route Pack One."

Prior to every mission, aircrews received threat briefings. This was particularly important since Route Pack One lays mostly in the outer fringe of Soviet SA-2 surface-to-air missile locations. Flying those missions was fun, but one thing that bothered me was responses I received when I asked if anyone knew what kind of evasive maneuver should be performed against an SA-2 launched at my aircraft. Some people "supposed" that a Split-S type maneuver "might" work. Others tried to describe something called a "whifferdill." Usually I got a blank look and a shrug.

As the years passed, the Army came out with TC 1-144, "Aircrew Training Manual: Surveillance Airplane." Sure enough, it had a task called "Perform Electronic Countermeasures/Evasive Maneuvers." The only problem was that when I started reading and got to the maneuver part, all it said was "perform appropriate evasive maneuver."

After 10 years I still didn't have an answer. I found out later that it wasn't a case of nobody caring. It was fully recognized that OV-1 evasive maneuvers would have to be developed, but for many years it was simply the age-old problems of defining test parameters, finding airframes and then getting somebody to pay for it. Then, in 1982/3 an ambitious test program was conducted. But what to do with the test results? Well, rather than let them gather dust in an archives, sanitized descriptions of the generic maneuvers were incorporated into the development of the field circular series of the aircrew training manual (ATM). When the test report was being finalized, the ATM was also being revised. So it was a good time to get the maneuvers into the "How to Fly" books.

In early 1985, units began receiving copies of Field Circular 1-217. Sure enough, a new task, Number 2002, was there listing seven evasive maneuvers: Split-S, Modified Split-S, High Speed Dive, Orthoganal Break, Jink, Ninety-Degree Turn with Descent and a Diving Spiral.

Finally we had something that told us what an "appropriate evasive maneuver" was, or so we thought. Soon enough phones began ringing at the Directorate of Evaluation and Standardization, with many questions about unit training programs for these new maneuvers. Well, rather than shrug, this article answers the most often asked questions and adds some training philosophy.

Why should we train in evasive maneuvers? It beats letting a missile fly up your exhaust stack. Even in peaceful times, we operate Mohawks in areas where an "incident" can be encountered with little or no provocation. Despite the stand-off capability of the OV-1/RV-1, aviators cannot count on being outside missile range and should never forget that they are not far from an airborne interception. OV-1s are acquiring devices which tell aviators they are becoming somebody's target, but until now nothing informed them about the best method of extraction from that situation. The best philosophy is to assume that you will be a target someday and to train for that eventuality.

What institutional training is being conducted? FC 1-217 does not tell the whole story, and for good reason. Much of what was learned during the 1982/3 tests was classified and could not be used in the ATM. But, the ATM does give aviators the generic task description for each evasive maneuver. As such, it "legitimizes" the training. This has been done so aviators can be trained to fly the maneuver. It makes little sense to attempt to perform a maneuver for the

first time as the tailfins of an SA-4 come into view.

Institutionally, aviators start training during attendance at the OV-1 Aviator Qualification Course at Ft. Rucker. Aviators are trained in basic aerobatic maneuvers, such as the aileron roll, loop and Split-S. These are considered "lead-in" training maneuvers for the next phase of training at the U.S. Army Intelligence Center and School (USAICS), Ft. Huachuca, AZ, the OV-1 Mohawk Aviator Track Course (2BF42). This course must be completed before aviators are considered qualified in the OV-1.

In addition to training in the various OV-1 mission systems, aviators attend a comprehensive block of instruction on radar, threat and aircraft survivability equipment while concurrently receiving training in evasive maneuvers. This combination of threat and maneuvers training maximizes the benefit to the aviators. Newly qualified OV-1 aviators arriving in your unit have not only learned how to fly the OV-1, but they also have been taught how to employ it and how best to survive the threat against it.

How does a unit begin a training program? As news commentator Paul Harvey says, "Now for the rest of the story." As stated, the ATM enables aviators to be trained to fly the maneuver. However, staying alive requires more than just maneuver. For example, a threat must be correctly analyzed for what it is, a decision must be made as to which type of maneuver should be employed against it, then aviators must know how to maneuver while simultaneously operating certain aircraft survivability equipment devices. When aviators can identify the type of threat, choose a maneuver and instinctively combine maneuver and operation of aircraft survivability equipment, you have fully trained aviators. To provide commanders with the necessary information on all of these aspects, the USAICS has published a pamphlet which incorporates the results of the 1982/3 tests, and its scope encompasses much more than just the maneuver. In fact, the evasive maneuvers contained in FC 1-217 were derived from this document. Commanders must use this document to establish a well-rounded "train up" program. The rationale is best described by quoting the references for FC 1-217, Task 2002: "No current Department of the Army literature describes the procedure for fixed wing evasive maneuvers. This manual (ATM) provides the generic task description for aviator hands-on training. These procedures have been developed in

continued on page 27

Suggested Training Program For OV-1 Evasive Maneuvers

SUBJECT	ACADEMIC HOURS	REFERENCES
Radar Principles	2.0	Note 1
Radar Command and Control:		Note 1
AAA	1.0	
SAM	1.0	
AI	1.0	
Aircraft Survivability Equipment:		Note 2
APR-44	1.0	
APR-39	5.0	
ALQ-147	1.0	
USAICS Pamphlet 95-1	1.0	USAICS Pamphlet 95-1
TM 55-1510-213-10, Chapter 5, Sections IV, V, VI	1.0	TM 55-1510-213-10

NOTE 1: USAICS instructors are trained at the USAF Electronic Warfare Penetration Aids Instructor Course. References used are classified USAF publications. To initiate steps in obtaining USAF classified reference material for radar principles and electronic combat operations, unit S-2 should write: Department of the Air Force, Headquarters Tactical Air Command, Langley AFB, VA 23665.

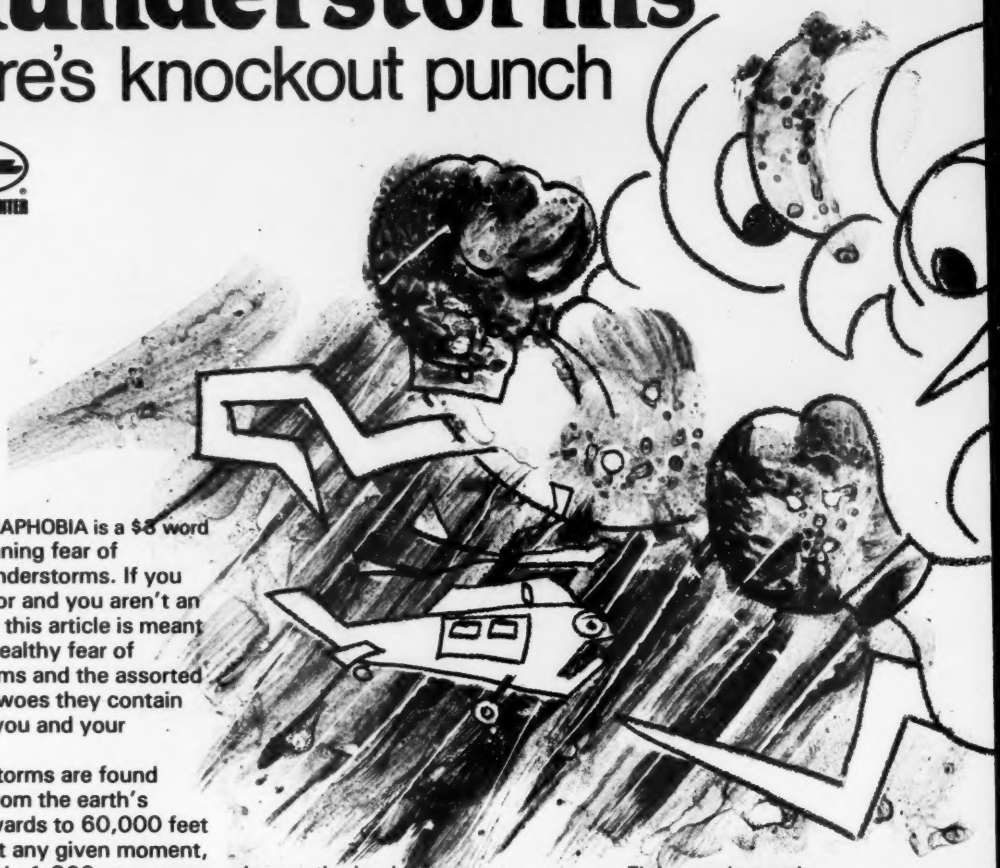
NOTE 2: Lesson plans are available through: Department of Combined Arms Tactics, Ft. Rucker, AL 36362-5000.

	FLIGHT HOURS	
Period One	1.0	• Review Stalls (Task 1014) • Review basic aerobatics (Tasks 2002, 2006 and 2007 subtasks 1 and 3). • Introduce practice night and low light maneuvers.
Period Two	1.0	• Review night/low light maneuvers. • Introduce and practice all day/VMC maneuvers.
Period Three	1.0	• Review previous maneuvers as required. • Conduct evaluation on selected maneuvers. (IP should simulate indications on ASE systems and evaluate aviator performance on a full variety threat.)

DES welcomes your inquiries and requests to focus attention on an area of major importance. Write to us at: Commander, U.S. Army Aviation Center, ATTN: ATZQ-ES, Ft. Rucker, AL 36362-5000; or call us at AUTOVON 558-3504, FTS 533-3504 or commercial 205-255-3504. After duty hours call Ft. Rucker Hotline, AUTOVON 558-6487 or 205-255-6487 and leave a message.

Thunderstorms
nature's knockout punch

U.S. ARMY SAFETY CENTER



ASTRAPHOBIA is a $8 word meaning fear of thunderstorms. If you are an aviator and you aren't an astraphobe, this article is meant for you. A healthy fear of thunderstorms and the assorted package of woes they contain could save you and your aircraft.

Thunderstorms are found anywhere from the earth's surface upwards to 60,000 feet or higher. At any given moment, approximately 1,800 storms are in progress around the world. That means as many as 44,000 thunderstorms may take place in one day. Those figures simply mean that your chances of encountering a thunderstorm are entirely too good—especially during the summer months.

There is no safe way to fly through a thunderstorm. The only safe way to operate around thunderstorms is to stay well away from them. Let's assume that you would never deliberately fly into a thunderstorm; after all, you didn't get where you are by doing dumb things. That still leaves the inadvertent encounter.

Aviators may inadvertently penetrate thunderstorms, fly too close to them or, in spite of precautions, get into the clutches of imbedded storms. One thing to keep in mind is that thunderstorms are hazardous to aircraft as far as 20 miles away. In addition to the dangers laterally, wind shear and turbulence in such storms can extend several thousand feet above the storm. When there are winds at the top of the storm that exceed 100 knots, significant turbulence may exist as much as 10,000 feet above the cloud tops.

Flying underneath thunderstorms isn't a good decision if you put much value on your life. Gust fronts underneath a storm can extend 10 to 15 miles in front and around it, and winds may exceed 120 knots. Such winds can create severe turbulence underneath the storm just as they do above it. The big difference is, you're operating closer to the ground so you don't have as far to fall.

Your weather forecast won't always tell you where the thunderstorms are. The crew of a U-21 F had conducted an IFR flight and was on letdown into the destination area when they

were instructed to hold. The aircraft entered holding IMC at 5,000 feet and was struck by lightning on the first holding pattern. The lightning temporarily disabled the autopilot, radar, both VORs, DME and the No. 1 VFH radio. It damaged one blade on each propeller, burned all static wicks on the aircraft, caused sheetmetal and rivet damage to wings and landing gear doors and blew off a small portion of the right elevator. Total damage amounted to around $54,000. And the thunderstorm shouldn't have even been there! It hadn't been forecasted and the storm was deemed a "freak" occurrence. The crew landed the aircraft safely and were commended for their performance under the circumstances.

The conditions under which thunderstorms develop are so common that they are found just about anywhere in the world you and your aircraft might operate. Therefore, an inadvertent encounter isn't at all far fetched. Take unstable or potentially unstable air, a relatively high moisture content and some manner of lifting, and you have the ingredients for a thunderstorm.

Your best safeguard against inadvertently flying into a thunderstorm is a thorough preflight weather briefing. But it doesn't stop there. You should check again just before you leave to see if there are any last-minute changes. Then, you should check frequently en route, monitor in-flight radio weather advisories (use onboard weather radar if available) and keep a constant look-out for developing weather.

Thunderstorms are generally either airmass or frontal. Airmass thunderstorm cells usually build up over land during the heat of the day and break up in the early afternoon or evening.

Puffy, innocent-looking white clouds can **quickly increase in numbers and appearance** and turn into cumulonimbus, or as many of you refer to them "cumulogranite." A cumulus cloud can change into a dangerous thunderstorm in minutes. If those things happen, you can expect turbulence, rain, lightning and possibly hail.

The squall or roll cloud extending downward from the base of a thunderstorm can mean a particularly violent storm. An aircraft that ventures too close to a roll cloud may be hurled into the storm.

There may be long bands of thunderstorms preceding a frontal system. These squall lines commonly appear in late afternoons and last until darkness or later. They are extremely violent storms and there is no safe way to get through or around them. To add to the dangers posed by squall lines, tornadoes may occur on their flanks or near the trailing edge. These tornadic vortices won't show up on your aircraft radar. Your best protection is knowing that they can be there and staying a safe distance away.

The new kid on the block as far as thunderstorms go is the mesoscale convection complex (MCC), but in size it's the granddaddy of them all. The MCC is not only large, it is slow moving and may persist for 12 to 16 hours. For these reasons, there isn't just a whole lot you can do but wait these storms out—safely on the ground.

The MCC consists of a very large grouping of thunderstorm cells formed in a circular or elliptical shape. These complexes include all the usual bag of tricks associated with thunderstorms: heavy rain, gusty surface winds, hail, thunder and lightning. They also affect upper air flow at jet levels, 30,000 to 40,000 feet. It's just like dropping a large boulder into a flowing stream of water. The flow of water is diverted around the boulder causing areas of faster-moving water, and areas of slow-moving eddies. In the case of a large MCC, the combined outflow and barrier effect of the complex significantly reduces wind speeds at jet levels to the southwest of the system's center and increases speeds to the northwest of the system. As the MCC grows, a pronounced

jet stream of high wind speeds forms along and downwind of the northern portion of the MCC cloud shield. In some cases, moderate or greater turbulence is encountered crossing the boundaries of the strong winds.

Winds

The winds associated with thunderstorms are as varied as they are hazardous. The microburst earns its name from the fact that it is normally of small size and short duration. These violent downbursts from a thunderstorm may descend to within 300 feet of the earth's surface before bursting outwards into winds with velocity of 100 knots or more. The lateral wind shear produced can mean a switch from a headwind to a tailwind of as much as 50 knots.

Microbursts are particularly hazardous to large fixed wing aircraft that are landing or taking off. There aren't enough statistics available to show the hazards of wind shear to helicopters. One reason for that is that helicopter pilots normally stay on the ground when conditions that produce microbursts prevail.

The biggest danger to an aircraft from the updrafts and downdrafts found in thunderstorms comes as it crosses the boundaries between them. With velocities as high as 6,000 feet per minute, turbulence resulting from the shear edges can be extremely hazardous. This kind of turbulence can be expected several thousand feet above and up to 20 miles laterally from a severe thunderstorm.

Lightning

The fact that lightning is found in thunderstorms will come as no surprise to you. Its frequency may surprise you, however. Those 44,000 daily thunderstorms we talked about earlier contain as many as 9 million flashes of lightning; that's 100 flashes per second. It isn't any wonder that more people are killed by lightning strikes than any other weather phenomenon, including tornadoes.

Not only is lightning a hazard in thunderstorms, it occurs in sand and dust storms, tornadoes, in volcanic ash clouds and, yes, even in snowstorms.

The crew of a U.S. Air Force CH-53C learned the hard way that you can't trust even innocent-looking clouds. Their helicopter was cruising at 8,000 feet, in and out of scattered clouds. When the aircraft encountered light icing, clearance was requested, and granted, to descend to 6,000 feet. There were still some clouds, but they were fewer at that altitude. As they approached one cloud, the aircrew discussed it and decided it was not a hazard. There was little vertical development and its color was light.

Shortly after the aircraft entered the cloud, it encountered more icing from a heavy snow shower. Before the helicopter could turn or descend, the crewmembers saw a bright flash and heard a loud bang, followed by severe aircraft vibrations. As caution lights flashed, the crew went into emergency procedures and began a descent. During the descent, the vibrations became so severe that flight instruments popped out of the instrument panels and electronic components in the aft radio rack broke out of their gimbal mounts.

The aircraft broke out of clouds at 2,500 feet agl and the crew made a safe, power-on landing in a nearby cleared area. Investigation showed the vibrations were caused by a failed tail rotor blade which had apparently been struck by lightning.

From January 1983 through February of 1985, there were 10 lightning strikes on Army aircraft. Although the usual damage was small, the total cost was $1,757,568. Fortunately, there were no fatalities or injuries.

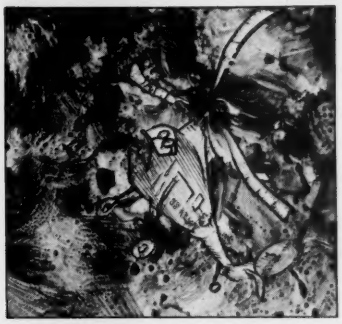
A U.S. Army UH-60A was at cruise flight over the German countryside. A tremendous flash was seen, followed immediately by an explosion. The aircraft shuddered, and the stabilator and low rotor rpm audio and numerous caution panel segment lights came on. The CP entered autorotation. The pilot placed both engine power control levers to lockout and manually retarded to 92 percent rpm. At about 800 feet agl, the engine and rotor rpm were matched. After approximately one minute of flight, the aircraft landed. The main rotor blade had been damaged along the spar and up to the tipcap. Forty percent of one tail rotor paddle was missing. Closer inspection revealed damage to several spherical rod end bearings and the Teflon linings were charred. The damage from this lightning strike was a whopping $1 million. There was no evidence found of crew or supervisory error and all operational and standardization procedures were followed.

Because of the hazards to flying operations posed by lightning, the National Aeronautics and Space Administration (NASA) has been using a specially-equipped F-106B to deliberately penetrate thunderstorms to gather lightning-strike data. From 419 thunderstorm penetrations made from 1980 through 1982, researchers learned:

1. Mean strike altitude was 8.7 km, or about 28,400 feet.

2. Mean strike temperature was -32° C.

3. Peak strike rate occurred at ambient temperatures of between -40° C and -45° C, whereas most previously reported strikes have occurred at or near the freezing level (0° C).



4. Lightning strikes have been encountered at nearly all temperatures and altitudes, usually where the relative turbulence and precipitation intensities are characterized as being negligible. Therefore, the presence and location of lightning don't necessarily indicate the presence and location of hazardous precipitation and turbulence.

New technologies in modern aircraft involve increased use of nonmetallic composite materials. Protecting all-metal aircraft from lightning strikes is well understood, but the lightning effect on composites is not. In addition, more and more digital electronic equipment is being used in avionics and control systems. We know that composite materials are poor conductors and must withstand the heat generated by current flow through high resistance. We also know that micro-electronics have a lower tolerance to voltage fluctuation and are consequently more vulnerable to lightning. More information is needed on the lightning threat to these new aircraft.

NASA's triggered lightning research project at Kennedy Space Center is part of an attempt to better understand the lightning environment and to develop protection for aircraft and avionics. The U.S. Air Force is participating in the research in an effort to learn more about protecting composite aircraft and electronic flight controls from lightning.

The Naval Research Laboratory, State University of New York at Albany, University of Florida and University of Arizona are participating in other NASA experiments. The experiments involve measuring horizontal and vertical lightning environments, return stroke velocity of lightning, developing ways to measure vertical fields, tracking thunderstorm buildup and collecting data on the geometry of lightning strokes.

The hazards from wind, turbulence and lightning to aircraft operations are well known, but there are still other components of thunderstorms that no pilot wants to encounter first-hand.

Hail

The danger from hail in thunderstorms is not as common as some of the other phenomena. That is small consolation, however, to the pilot whose aircraft is being bombarded with hailstones. Hail is most often encountered between 10,000 and 30,000 feet. Here again, however, hail may be encountered up to 20 miles from the main storms.

Icing

Thunderstorms lift large volumes of moist air. When this moisture is lifted above the freezing level it becomes supercooled at temperatures from -15° C to 0° C. Much of the supercooled water vapor becomes ice crystals. The remaining supercooled water freezes on impact when an aircraft flies through it. The ice that forms on the aircraft's surfaces adds to the other problems an aviator faces when his aircraft encounters a thunderstorm.

If, in spite of good planning and careful following of procedures, you inadvertently encounter a thunderstorm, you will have to decide quickly whether to turn back, head for an alternate airfield or try to circumnavigate the storm. If you actually penetrate a thunderstorm, you will have to base your decision of whether to continue on or turn back on all of the information available to you and your own best judgment of how to get out of the situation.

The best advice sounds simple (and like all advice, it is simpler to give than to follow—especially the last bit). It's still the best policy.

- Get those preflight weather briefings. It's the command's responsibility to have them available but it's your responsibility to get them.
- Diligently monitor radio weather advisories.
- Be alert and observe in-flight weather.
- Stay away from thunderstorms.

Sources

Bogard, James K. "Lightning and How it Affects Jet Aircraft." Boeing Commercial Airplane Company. **Boeing Airliner.** Apr/Jun 84.

Rosenberry, Donald L., CPT, USAF. "The Atmospheric Pandora's Box." **The MAC Flyer.** Apr 1985.

"A New Thunderstorm Threat: The MCC." **Flight Crew.** Spring 1984.

MONTHLY WRITING AWARD

I AM THE AVIATOR—ABOVE THE BEST

©1983 by Captain Walter R. Cook

FROM THE BEGINNING, many themes have been woven into the fabric of flying: Man against gravity; man against distance; man against time. But the basic theme of the early years was as old as the oldest flying legend, and still remains so today:

"Man against death!"—

"I am the aviator. Above The Best!"

For 120 years I have served my country.

I was there at the war that pitted brother against brother.

I braved the elements in my frail cloth and wicker helium balloon.

I surveyed the battlefield at Manassas (Bull Run), and Fair Oaks, too.

I sent accurate information to our commanders on the ground.

I kept watch on the enemy as he made his every move.

I AM THE AVIATOR—ABOVE THE BEST!

I was with Teddy and the roughriders as they charged up San Juan Hill, providing timely enemy intelligence, from my balloon high overhead.

I was there in the perilous air decade before the First World War, always willing to leave the comfortable earth on fragile wings proving my blend of courage and curiosity, dedication and daring.

When tension arose along the Mexican border, I was there in Texas to help track down Pancho Villa.

With my fragile fabric covered wings, and my canvas stretched taut, I learned my lesson in the boiling sun and the blowing sand.

I AM THE AVIATOR—ABOVE THE BEST!

Even though the airplane was still little more than a powered box-kite, when the great war in Europe began, I was there, willing to wear another struggling country's uniform—such as the British Royal Flying Corps or the French Escadrille.

I was there with Billy Mitchell, when America entered the war in Europe.

I went over there, determined to darken the skies over Germany with my thundering wings.

I met their best—Baron Von Richthofen and his flying circus. But, their best was not good enough. And, I soon overwhelmed the Kaiser and earned my wings.

I AM THE AVIATOR—ABOVE THE BEST!

When it was finally over, "over there," I did not rest.

I flexed my canvas wings and they turned to steel.

With the war clouds darkening over Europe and the Far East, I was ready to help my brothers, as we fought the Luftwaffe and the Rising Sun.

I assaulted the African shore; and covered the Infantry at Anzio. I bounced over Rome, and Normandy too. I swarmed over the Fatherland. It was I who set the Rising Sun!

I AM THE AVIATOR—ABOVE THE BEST!

In the few short years after "the big one," I became the first "autogiro," and bore the first helicopter pilots in the world. I was split in two. A part of me provided strategic long-range support, while the rest of me remained dedicated to my brother, the ground commander.

So, we split, and we started Army Aviation anew. An arm also made up of dedicated men and women, with the spirit of Aviation running through their veins. In this way, we were able to properly divide our valuable time between long-range support and close support, for my brothers on the ground.

In Korea, I carried the wounded, but also, I proved to the ground commanders that I, the helicopter pilot, could perform many diversified jobs in the combat zone.

I offered them airmobility and aerial medical evacuation. I proved that I did not need any: roads, bridges or airports; I could land and takeoff wherever there was clearance for my whirling blades and also proved that my potential was unlimited.

In Vietnam, I performed my first mission with great speed and success. As the war dragged on and intensified, heavier and heavier demands were placed on me and I became more and more important; and I continued to perform with even greater speed and success. In fact, no major battle was fought without me. As the 1st Aviation Brigade, I flew countless successful missions, from the DMZ to the Delta.

I helped the First Cav to become "Sky Cav" troopers.

It was I who carried the "Screaming Eagles" into the A Shau Valley.

Through bitter fighting, I proved how I earned my names of: "Pink-Team"; "Gun Slingers"; "Bounty Hunters"; "Widow Makers"; and "Thunder Daddy." I showed how I received the names: "Dustoff"; "Wings of Mercy"; and "Big Windy", too.

We learned to skim the treetops, and bring forth fiery death with our sharp talons to the unsuspecting VietCong.

I provided: transport, reconnaissance, surveillance, communications, and of course, firepower.

I carried the Infantry on my broad shoulders. I transported the heavy artillery to our many fire bases. Through bitter fighting, and superb airships, I gave military planners a peek at my unlimited potential.

I AM THE AVIATOR—ABOVE THE BEST!

I was there under the sweltering Caribbean sun of Grenada with the All American Division.

I was ready to expertly perform many no-notice missions, such as rescuing stranded Americans and to air assault the Rangers into the very heart of the antagonists.

I—Army Aviation—have been tried by the unforgiving crucible of combat and emerged victorious!

Around the world I continue to fly in any environment, always forward, with my cannon or TOWs steady aimed, and with a calm resolve.

My whirling blade is my bayonet.

I am now a full-fledged member of the combined arms team.

I can add a force multiplier to any battlefield, employing my greater range, greater lift and my greater firepower.

I continue to keep the peace worldwide in freedom's cause.

I am there with the "Screaming Eagles" in the hot blowing sands of Egypt.

I stand ready at the Fulda Gap, ready to hold the first line.

I am in Korea, lifting troops, and guarding freedom's most perilous frontier.

I am always ready to go where I'm needed, when I'm needed.

"I AM THE AVIATOR—ABOVE THE BEST!"

ARMY AVIATION

PUNCH BOWL CEREMONY

This punch bowl ceremony has been used by the Directorate of Evaluation and Standardization at Ft. Rucker, AL, for appropriate Army Aviation functions such as dinings-in or dinings-out. Seventy slides support the narration. Each is numbered and keyed in on the right hand side of the manuscript. The **Aviation Digest** *has several sets of these slides which your unit is welcome to borrow. Write the* **Aviation Digest** *at P. O. Box 699, Ft. Rucker, AL 36362-5000, and tell us when you need the slides and when you will return them. You can call us at AUTOVON 558-6680 to request the slides, but your call* **must** *be followed by a letter from your unit. Our commercial number is (205) 255-6680 and the FTS is 533-6680. Be sure to allow enough lead time for us to mail the slides to your unit. And remember, when you have used the slides, return them to the* **Aviation Digest** *as soon as possible. There may be others waiting to use them.*

CEREMONY

THE UNITED STATES Army's newest branch—Army Aviation—has no peers when it comes to the Army's development and execution of airmobile and air assault tactics. Airmobility and air assault are synonymous with Army Aviation. In fact, they are the heart of the history of Army Aviation—from World War II, when its roots began to take hold, through the emergence of the helicopter in the Korean and Vietnam Wars. Today, we find that this highly mobile member of the combat arms team is the key to the success of the AirLand Battle.

This ceremony, then, is designed to both pay tribute to Army Aviation's people today, and also to recall and recognize the dreams and hopes of those who came before us and gave their lives, blood and sweat, for Army Aviation—those who stuck with the concepts of airmobility and air assault through the lean years.

Army Aviation was born 6 June 1942, in the midst of a great many field artillerymen who were busily intent on mobilizing at Ft. Sill, OK, for all-out war against the Axis. It was appropriate that the birth of Army Aviation be at the Field Artillery School, because it was Artillery officers, flying primarily L-4 Cubs plus some L-2s and L-3s, who took the initiative in the 1930s and 1940s to convince the War Department that the Army needed its own aircraft, organic to the units it served. At first, only Artillery was allowed to have aircraft. But when Army Aviation went to war in the L-4 it soon proved its value by flying numerous airmobile-type missions for most major ground combat units. Within 3 years the War Department made Army aircraft organic to Cavalry, Infantry, the Corps of Engineers, Armor and Tank Destroyer units. To honor the birth and early growth of Army Aviation we first pour red port wine. The red is intended as a salute of thanks to those believers of the 1930s and 1940s who wore Artillery red. We use port because it is noted for stability and never turning sour.

1. Wings
2. OH-13
3. CH-47
4. UH-60
5. Wings
6. Army Times
7. L-4
8. L-2
9. Wings

Four men—Allcorn, Shell, Butler and Devol—were the first Army aviators in combat. Flying L-4 Cubs from the deck of an aircraft carrier, their mission was to direct artillery fire during the invasion of North Africa on 8 November 1942. They were the vanguard of many other Army Aviation people who followed and lay the solid foundations for the concepts of airmobility and air assault. Among the first to arrive were Oswalt and Ely; Ely was destined to become the Army's first helicopter pilot; also Gillespie—and Johnson, who was one of the first Army aviators killed in combat. The list lengthened as Army aviators from the first three pilot classes landed in North Africa and, flying their L-4s, they swept east to Tunisia with the ground combat units. Then they were in Sicily, and at Anzio, where the L-5s joined the fight. With the L-5s now supplementing the L-4s, they advanced on Rome and after the Italian capital fell, they pursued the German Army north across the Alps.

At Normandy, other Army aviators joined the fight—Gregorie, Condon and Swenson were among the first to cross the English Channel. After the breakout at Normandy, they raced across Brittany after the retreating Germans; Army aviators were at

9A. Allcorn
10. L-4 Preparing To Takeoff
11. Takeoff
12. Ely
13. L-4s In North Africa
14. L-5
15. Condon and L-5

Paris when it was liberated. They crossed the Rhine and penetrated into Germany with Patton and the Third Army. They were present when the Third Reich fell, smouldering in ruins.

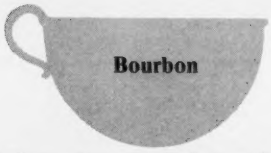
In the Pacific, the Japanese reeled under the growing might of the United States military buildup. As American ground forces advanced toward the Japanese homeland, Army aviators were with them at Lingayen Gulf, Bougainville, Luzon, Saipan, New Guinea and Okinawa—and these aviators were among the first to arrive in Tokyo when the Japanese Empire surrendered. In memory of those Army aviators that fought and died in World War II, we pour bourbon, an all American victory drink that warms the heart.

16. L-4 On Auto-Bahn

17. L-4 In Pacific

18. L-4 At Tokyo Zeros On Ground

19. Wings



At first, Army Aviation training was handled in various departments at Ft. Sill, OK, but under the leadership of men like Ford and Wolf, Shirmacher and Baker, Leich and Williams, and Bornstein and Fortner, the training program grew rapidly. The Army Aviation School was created on 1 January 1953—but later the Secretary of the Army changed the date to 6 June to coincide with the birth of Army Aviation.

Eventually, the rapidly maturing Army Aviation School outgrew its space at Ft. Sill. The Aviation School's leaders, Hutton, Gonseth, Ernest and Arey helped find a new home at Camp Rucker, AL. The move began in August 1954, and in December the Army Aviation School celebrated its first Christmas in its own home. Within the year Army Aviation's continued growth led to the formation of the Aviation Center and the redesignation of Camp Rucker as Ft. Rucker, AL, a permanent post. In keeping with the spirit of the first Christmas at Camp Rucker, AL, we pour rum, a festive, biting drink that reflects youth and vitality.

20. Ft. Sill, OK

21. Ford and Wolf

22. Shirmacher and Baker

23. Leich and Williams

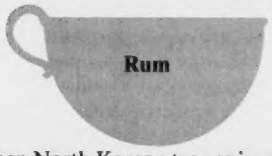
24. Bornstein (L) Leich (C) Fortner (R)

25. Ft. Sill Growth

26. Hutton

27. Camp Rucker

28. Wings



When North Korean troops invaded the Republic of Korea in June 1950, the United States Army reacted to counter the Communist surge. Army Aviation was there, at first with L-4s and L-5s. By February 1951, it had the L-19 Bird Dog at the front. The Bird Dog, later designated the O-1, was Army Aviation's first all metal, high wing observation and reconnaissance airplane.

While the value of Army Aviation in support of the ground forces was proven in World War II, the Korean War brought out new, bold concepts using helicopters to provide airmobility on the battlefield. An extremely effective system of battlefield aeromedical evacuation was developed, and seeds were planted that in later years would grow and flourish into an armed helicopter program.

The 6th Transportation Company (Helicopter) with its H-19 Chickasaws, was the first helicopter unit to arrive incountry and flew the Army's first airmobile combat mission in support of the 3d Infantry Division. Soon the 13th Transportation Company (Helicopter) arrived and airmobile operations were expanded. In one critical battle, the Eighth Army commander said he could not have held the main line of resistance without the responsive support of cargo helicopters.

The names Strawn, Bowler, Gaddis and Sebourn are recalled because these men all had important parts in the development of the medical evacuation system that flew 21,212 casualties to medical care during the war. The 6th and 13th Transportation Companies helped, but the 2d Helicopter Detachment's H-13s did most of the medical evacuation work. They lived with and aided the wounded throughout the war. In tribute, the troops nicknamed the H-13s "Angels Of Mercy." We honor those who gave their lives in the Korean War, and

29. North Korea Invades

30. L-19 Bird Dog

31. Wings

32. UH-19 Chickasaw

33. Loading Wounded on UH-19

34. OH-13s Medevac Angels of Mercy

those who flew Army Aviation's missions—and especially those who flew the Angels Of Mercy to find the lost and wounded. We pour brandy, which historically has been used as a heartwarming drink, a drink to comfort the wounded.

35. Wings

After the Korean War, interest mounted in arming of helicopters. Hutton, Vanderpool, Ballentyne, Hammond, Lombard, Womack, Carter and a great many more earned themselves the name "Vanderpool's Fools." They innovated, invented, scrounged and worked around-the-clock to develop armament systems, as well as airmobile and air assault tactics. They started over again and again when armament systems or tactics failed. But, they developed the tactics and built the basic armament kits that led to today's helicopter ordnance systems. By 1958, they formed the 7292d Aerial Combat Reconnaissance (ACR) Company—which later carried other designations, but generally was known to the troops as the ACR Company.

36. Vanderpool and Article

37. Vanderpool's Fools

38. SS-10 on OH-13 Sioux

39. CH-21 Shawnee Firing

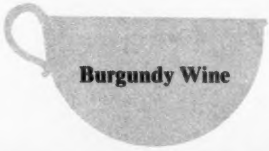
As the generation of Vanderpool's Fools moved on, the baton was picked up by others, such as Cairns, Easterbrook, Cook, Burdett, Shoemaker, Oswalt, Jones and Oberg. As they continued developing airmobile and air assault tactics and armament, their work became recognized throughout the Army. While they were proving the feasibility of arming helicopters, their efforts paid off for the Army which in 1962 was ready to organize and test its first airmobile division. The ACR Company was summoned to Ft. Benning, GA, and became the nucleus of the 11th Air Assault Division. To honor Vanderpool's Fools, and those who followed them, we pour a hearty burgundy wine. It best reflects the character of Vanderpool's Fools and their successors, who took the bitter with the sweet, and lay the groundwork for the development of airmobile and air assault tactics.

40. Cairns

41. Easterbrook

41A. Oswalt

42. Wings



In the early 1960s, the evolving concepts of airmobility and air assault were associated with men like Howze, the father of Army airmobility and air assault, and Kinnard who commanded the successful 11th Air Assault Division and the subsequent 1st Cavalry Division (Airmobile). In 1961, as hostilities intensified in Vietnam, the Army became more airmobile-minded. This was reflected by the fact that in August 1961, the Army sent two CV-2 Caribou companies, totaling 32 airplanes, to Vietnam where they joined the U-1A Otters that were already incountry. Then, in December 1961, the 57th and 8th Transportation Companies (Light Helicopters) arrived in Saigon with their CH-21 Shawnees. OV-1 Mohawks were onstation in 1962, and in 1964, UH-1 Hueys began replacing the H-21s, H-34s and H-13s.

43. Howze

44. Kinnard

45. CV-2 Caribou

46. U-1A Otter

47. CH-21 Shawnee

48. OV-1 Mohawk

49. UH-1s over CH-34

The 1st Cavalry Division (Airmobile) was on the scene by 3 October 1965, with its

50. 1st Cavalry Poster

15,500 officers and enlisted men, 1,600 vehicles and 434 aircraft. By November it was heavily engaged in the Ia Drang Valley. The 1st Aviation Brigade was organized to control Army Aviation operations not under a division; the Utility Tactical Transport Helicopter Company was commanded by Runkle and became the United States' first attack helicopter company in combat. It originated most of the Army's tactical doctrine for helicopter air assault missions. Airmobile operations were boosted even more in 1965 when a second airmobile division was created, the 101st Airborne Division (Airmobile).

51. Troops and UH-1

Army Aviation, with its growing air assault capabilities was needed to reverse the enemy's furious attack in the 1968 Tet Offensive, and in 1971 it provided the airmobile and air assault tactics needed in LAMSON 719 to strike a devastating blow at the North Vietnamese in a large-scale attack on the Ho Chi Minh Trail. Army aircraft met intense and highly sophisticated antiaircraft weapons systems in these battles and proved they could fight and win in a high intensity combat environment. All across Vietnam, Army Aviation repeatedly validated the concepts of air assault. And, all across Vietnam, the successes of Korea's Angels of Mercy were reflected in the success of Dustoff—as Army aviators, such as Brady and Novosel, flying UH-1 Hueys braved withering enemy fire to reach their fallen comrades and fly them to safety. Now, in the wake of the Vietnam War, we pour rice wine, which is an appropriate salute to all in Army Aviation who fought and died so valiantly in the "Rice-Basket" of the world.

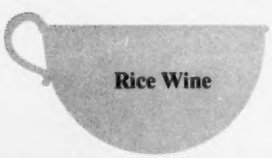
52. CH-47 in LAMSON 719

53. CH-47 In Flight

54. UH-1 Medevac

55. Fire Fight

56. Wings



Following the Vietnam War, the names Maddox, Smith, Vessey, Merryman and McNair were involved with a series of studies that had a far-reaching impact on building airmobility and air assault into the Army's combat structure. The first air cavalry combat brigade was initially commanded by Canedy. This resulted in placing air cavalry combat brigades in light and heavy divisions—and the 9th Cavalry Brigade (Air Attack) sprang to life under the command of a man named Harvey. It is a part of the 9th Infantry Division at Ft. Lewis, WA. In the midst of this activity, the Army Chief of Staff designated Army Aviation as a combat arms specialty, making Army Aviation a full-fledged member of the combat arms team. Army Aviation was a full partner, and only one step remained—branch status. On 13 April 1983, the last milestone was achieved when the Secretary of the Army, John O. Marsh, approved Army Aviation as a separate branch of the Army. The names of new heroes must now be added to our history. Meyer, Otis and Galvin, all nonaviators, believed in Aviation and made it possible for the branch to be formed. West, Harrison and Estes developed the implementation plan and charted our initial course. Maddox and Parker have commanded the Army Aviation Center of excellence during this, our most challenging era. We pour champagne to salute those who came before and those who, today, lead us forward as the newest, strongest and swiftest branch of the Army.

57. Maddox, William

58. Smith

59. Merryman

60. McNair

61. 6th ACCB Cover

62. Canedy

63. Harvey

64. Wings

65. Maddox, Bobby

65A. Parker

66. Wings

Army Aviation has flown "Above The Best" through three wars. It always provided ground commanders with the air assault support needed to win in combat. Now, with branch status, we stand on the threshold of unlimited potential in the development of Army Aviation tactics. We'll still be flying Above The Best, but now we'll also be fighting shoulder-to-shoulder as a full combat arms partner in the finest Army in the world.

67. View Out Helicopter Window

68. UH-1s Landing

69. AH-64s

70. Wings

AVIATION PERSONNEL NOTES

New GI Bill

The new GI Bill of 1985, is scheduled to replace the current VEAP (Veterans Educational Assistance Program) on 1 July 1985. The new Bill has the following salient provisions:

- Soldiers entering active duty on or after 1 July 1985 will be automatically enrolled in the program unless they choose to disenroll.
- Those enrolled in the program will have their basic pay reduced by $100 per month for their first 12 months of service.
- Upon completion of 3 years of continuous active duty, soldiers will be eligible for a maximum of $10,800 of basic benefits for full-time schooling.
- The law authorizes Department of Defense to increase the rate of basic benefits up to an additional $400 a month for soldiers enlisting for critical military occupational specialty skills.

Soldiers must have a high school diploma or a high school equivalency certificate prior to completion of their first enlistment. The new GI Bill is not available to Reserve Officers' Training Corps scholarship graduates or West Point graduates entering active duty as of 1 July 1985.

Vietnam era GI Bill eligibles whose benefits end 31 December 1989, can:

- Serve 3 continuous years beyond 1 July 1985 and qualify for the new maximum basic benefit ($10,800), and are not required to make a contribution to receive this benefit, and
- Also receive half of their Vietnam era GI Bill stipend, up to a maximum of 36 months.

Since service members eligible for the Vietnam era GI Bill qualify for the New GI Bill's basic benefit of $300 for each month of schooling, plus one half the remaining entitlement on the current GI Bill, provided they are on active duty on 1 July 1985 and remain on active duty for 3 years, they *do not have to separate from the Army* solely for the purpose of using the Vietnam era GI Bill prior to its expiration on 31 December 1989.

U.S. Military Academy Preparatory School (USMAPS)

Each year 170 active duty soldiers are selected to attend the USMAPS, at Ft. Monmouth, NJ. This school offers enlisted members the chance to continue on to the U.S. Military Academy at West Point.

In order to apply, applicants must be:

- U.S. citizen or able to become one before entering the school.
- At least 17 but not older than 21 on July 1 of the year they enter the school.
- In good health, with no disqualifying physical defects and with vision correctable to 20/20.
- High school graduates or the equivalent, with a solid academic background.

Army Regulation 351-12 contains the application procedures. Contact your military personnel office (MILPO) for details. For more information, call the USMAPS Admissions Office at AUTOVON 992-1807/1808 or write to: Commandant, USMAPS, Ft. Monmouth, NJ 07703-5509.

Engineering Test Pilots

Congratulations to the 10 officers selected by the 1985 Army Aviation Engineering Test Pilot Selection Board. These officers were selected as "best qualified" from the 58 applicants considered by the board. The selectees are:

CPT David B. Cripps
CPT James M. Hesson Jr.
MAJ William S. McArthur
CW3 Ray E. Stanton
CPT Thomas C. Wallace
CPT Charles D. Gemar
CPT William D. Lewis
CW3 Peter G. Petersen
CPT William H. Stormer
CW2 Thomas E. Wright

The selection of Army aviators for participation in the program is made by an Officer Personnel Management Directorate (OPMD) board. Those selected will

attend the Army Test Pilot Orientation Course at Edwards Air Force Base, CA, to receive academic and flight refresher training. At the U.S. Naval Test Pilot School (NTPS), Patuxent River, MD, they will undergo a comprehensive 11-month course specifically tailored and designed to provide the "additional" training required to make a good regular pilot (with a strong engineering and mathematical background) into a newly trained engineering test pilot. Even then, some on-the-job training is required to get these pilots accustomed to the Army flight testing requirements. These test pilots are then qualified for and will be assigned to both research and development and Aviation Branch 15 positions.

At present there are 63 engineering test pilots on active duty to meet 39 authorizations. Additionally, 8 aviators are presently training and 18 scheduled to begin training by January 1987. This coupled with the high caliber of officers in the Aviation Branch makes the competition for selection fierce. The 10 officers selected by the 1985 board have bachelor degrees in engineering with excellent grades in calculus and physics. Seven of the selectees are dual rated and all are multiengine qualified.

The next OPMD Engineering Test Pilot Selection Board is planned for February 1986. DA Circular 351-84-3, "Army Engineering Test Pilot Program," contains the prerequisites and application procedures. Don't wait until the last minute to submit your application. Further information is available at the Aviation Plans and Programs Branch, USAMILPERCEN, ATTN: DAPC-OPA-V, 200 Stovall Street, Alexandria, VA 22332-0400; AUTOVON 221-8156/8157.

Attention AMOC Phase II Grads!

Check your Officer Record Brief. If the appropriate Phase II qualification is not annotated in Section VI, Military Education, see your servicing MILPO to make the SIDPERS entry. An example of how it should read is—ACFT MOTP CRS (UH-1). Don't miss a good assignment because your record is not up to date!

The Right Stuff

As a means to support the continuing space shuttle effort, National Aeronautics and Space Administration (NASA) now selects astronaut candidates on an annual basis and so does the Army. In November 1985, the Army will select candidates for nomination to NASA, and will accept applications for the 1985/86 Astronaut Candidate Selection beginning 1 July 1985 and ending 1 October 1985. A MILPO letter is forthcoming which will outline the selection criteria and provide guidance in submitting applications. This program is open to all ages and ranks. Any Army personnel with a bachelor's degree in engineering, biological or a physical science or mathematics, who aspire to become astronauts are encouraged to submit an application through the chain of command.

At present, three Army officers are detached to NASA as astronaut mission specialists. COL Bob Stewart, LTC Woody Spring and MAJ Jim Adamson are all members of the Aviation Branch, experienced aeronautical engineers and graduates of the Naval Test Pilot School. They will be joined soon by CPT Charles D. Gemar.

Keep an eye out for the MILPO letter! Questions regarding the Army Astronaut Candidate Program should be directed to MAJ Hinds, USAMILPERCEN, ATTN: DAPC-OPA-V, 200 Stovall Street, Alexandria VA 22332-0400, or AUTOVON 221-8156/57, commercial (202) 325-8156/57.

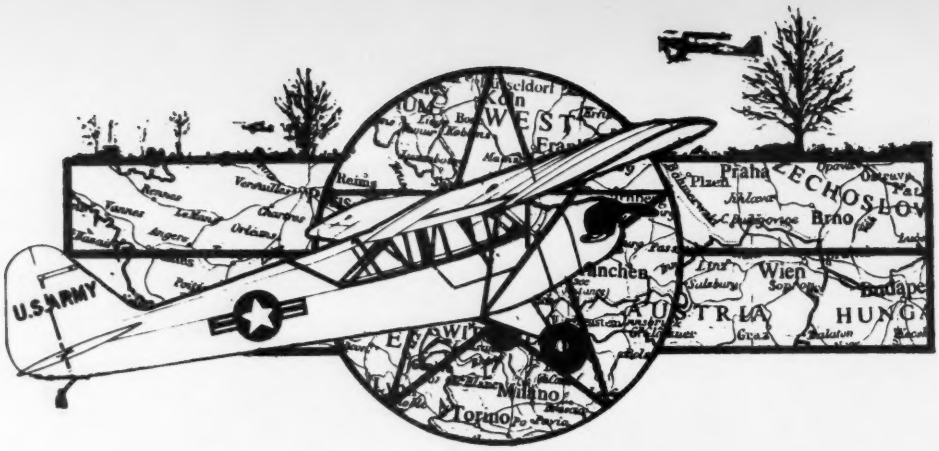
DES Report to the Field *continued from page 15*

actual flight tests, and trainers should consult the USAICS pamphlet for further information of a classified nature regarding threat, maneuver and countermeasure procedures. If this pamphlet is not available, copies can be obtained through Commander, United States Army Intelligence Center and School, ATTN: ATSI-TD-OTD, Ft. Huachuca, AZ 85613."

For unit commanders, the optimum choice is to send unit instructor pilots to Ft. Huachuca to be trained. Some units have done this and are well satisfied for having made that effort. Commanders wishing to do this can contact CW4 Raymond G. Cech at AUTOVON 879-3029/3753 (commercial: 602-538-3029/3753). For unit instructor pilots and trainers, a suggested training program is shown on page 15.

Two final notes: Units conducting such training should confine all evasive maneuver training to their assigned dual-stick Mohawk. There is absolutely no reason for exceeding 3 Gs during training, and restricting training to lighter aircraft will not only facilitate hands-on training but will also assure the limits of the flight envelope are not exceeded. Second, Change 1 to the USAICS pamphlet has been completed. This change incorporates test results for the RU-21H, EH-60 and EH-1 which should be of interest to users of these aircraft.

After years of not knowing just what the "appropriate evasive maneuver" should be, Mohawk pilots and commanders now have the tools to begin training to stay alive. You now have the rest of the story.



Army Aviation in Europe

6 June 1944 – 8 May 1945

Both the L-4 and L-5 observation reconnaissance aircraft played a vital role in World War II from D-Day to V-E Day. The following article relates some accounts of those historic aircraft.

Dr. Herb LePore
Office of the U.S.
Army Aviation School Secretary
U.S. Army Aviation Center
Fort Rucker, AL

AS THE RESULT of the Vietnam War, millions of Americans have come to know the role of organic Army Aviation. Every evening they had only to turn on the television set to see the ubiquitous helicopter and how important it was to thousands of fighting troops and other people in Vietnam.

However, Army Aviation had its baptism of fire in World War II, with the L-4 and L-5 observation and reconnaissance aircraft. They were the primary aircraft used by Army Ground Forces (AGF) and were initially given the nickname "Grasshopper," because in 1941 an Army general observed a J-3 (a civilian version of the L-4) making a landing in the desert near El Paso, TX, and remarked the aircraft looked like a grasshopper when it landed.

The L-4 first entered combat in the Northern African Campaign and was used in Italy, the European Campaign and in the Pacific Theater of Operations. The Normandy Landing on 6 June 1944, by the United States Army and its Allies, and the subsequent drive across the European Continent in 1944 and 1945, brought about the most extensive use of the L-4s and L-5s.

The Grasshopper could be referred to as a combat aircraft, yet an unarmed combat aircraft. It was rather innocuous looking. It was not an imposing airplane; small, with a tandem two-seat configuration, and a 65-horsepower Lycoming engine. As previously mentioned, it was basically an unarmed aircraft, with no armor plating, thus vulnerable to even small arms fire. With the 65-horsepower engine, the L-4 set no speed or endurance records; though punsters said pilots had to have endurance to fly the plane. The L-4 had other nicknames pinned on it during the European Campaign, such as the "Flying Flimsy," and the "Maytag Messerschmitt." Also, as the war raged on, the L-4 began to be referred to more and more as the Cub.

The Beginning of the End—D-Day

On 6 June 1944, the largest armada of ships and men ever assembled began the greatest invasion undertaken on the European Continent. More than one

and one-half million men from several nations, including the United States, and thousands of tons of equipment eventually came ashore on the bloody beaches of Normandy in France. Overhead, an umbrella of hundreds of fighter bombers and conventional bombers struck enemy fortifications, supply lines, and vehicles and trains caught in the open. At the same time, Allied warships provided what seemed to be a never ending bombardment of German shore gun emplacements. While all of this was taking place, the first L-4s were flying across the English Channel from forward bases in England to begin calling in Army artillery fire and some naval gunfire on enemy positions along the Normandy Coast. Some L-4s came ashore at Normandy in crates, were assembled, and flown off the beach, and within a few minutes of being operational and airborne, the pilots called in either artillery and/or naval gunfire on German strong points.

L-4 pilots for the first few weeks of the Normandy operations found themselves landing at the most unusual sites. Some landed in pastures and had their landing rights contested by an irate bull or cow, while other pilots put down their L-4s on dirt roads, vineyards, railroad tracks and even cemeteries. At times, the fluidity of the tactical situation was such that L-4 pilots could not land back at the airstrip from which they had taken off. However, the Flying Flimsies did not let the anxiety of a war zone disrupt their mission. They still called in artillery fire, and dropped messages and supplies to beleagured American units. The little L-4s with their washing machine engines, as they were called, time and time again braved hostile fire to support American units.

The battle of Saint-Lo, France, in the summer of 1944, brought about the breakthrough of Allied Forces from the Normandy Peninsula.

In this battle, organic Army Aviation played an important role. The Cubs serving in their liaison and observation capacity, called in air strikes on observed targets, and coordinated infantry-artillery movement and fire against German positions. Eventually, the enemy was forced to abandon Saint-Lo.

Artillery observation Cubs temporarily grounded by flood waters in the Seventh Army, Rambervillers, France, area, 8 November 1944.

One thing noteworthy was that the L-4s had the audacity to fly behind enemy lines and call in artillery on rear area units. However, the unarmed L-4s could not fly over the enemy rear with a sense of impunity; they were not impervious to the accurate and deadly fire of the 88 mm antiaircraft guns, nor to menacing fighter planes, such as the Messerschmitt 109 and the Focke-Wulf 190. These enemy fighter aircraft exacted a toll of the L-4s.

Most of the time throughout the European Campaign, Army spotter aircraft did not have any fighter cover when they flew their missions. When attacked by enemy aircraft, if not caught totally unaware, the little L-4s could fly slow and low enough to take evasive action. German fighter pilots were wary about trying to chase the Cubs who flew low to the ground. The much faster pursuit planes could not maintain a slow enough airspeed without stalling and crashing. Also, at times, unsuspecting fighters would chase a seemingly hapless L-4 back over American lines, only to fall victim to American antiaircraft fire—which had been called in on the pursuing airplane by the L-4 pilot.

According to some sources, ME 109 and Focke-Wulf 190 pilots were given four points credit for each L-4 shot down, while being given two points for a fighter being shot down and three points for a bomber. If this point award system actually existed and is historically accurate, it illustrates the effect of the L-4s upon enemy operations.

A German lieutenant colonel who was captured by the U.S. Army near the Meuse River in Northern France at the end of August 1944, told his captors that the aerial observation airplane had done more to bring about the defeat of his battalion than any other weapon the Americans had. He further stated L-4s would fly over his battalion area and call in murderous artillery fire on his troops, from which there was no escape. There were a number of comments made by captured enemy soldiers.

A United States Third Army after-action report in 1945 alluded to the testimony of an enemy medical officer

ABOVE: An artillery observation plane with Major Jack Blohm, Des Moines, IA, at the controls, starts with newly fitted skis (30th Infantry Division), Belgium, 11 January 1945.

RIGHT: A U.S. Army liaison plane takes off on a snow covered runway (1st Infantry Division), 14 January 1945.

who said that more than 80 percent of the casualties brought to the rear area in November 1944 were the result of artillery fire, called in by aerial observation aircraft. Indeed, careful coordination between the Field Artillery and the Cubs wreaked havoc on enemy troop units. The Germans pinned the label of "Iron Gustav" on the versatile L-4, as a grudging tribute to its accomplishments.

One of its apparent achievements was the fact that aerial observation planes gave artillery a special advantage—that being defilade protection for the guns and visibility for the observer. Aerial observation mitigated somewhat the need of hilltops or ridges for artillery spotting.

The L-4 and L-5 pilots and observers in the European Campaign of 1944 and 1945 lived a rugged life behind the battle lines. Being attached to an Artillery unit normally meant the L-4 crew moved with the guns, sleeping on the ground and eating C-Rations. When landing near the front the Cubs had to be quickly camouflaged so enemy aircraft could not locate them.

These pilots, as opposed to the Army Air Force pilots, had none of the preferential treatment accorded fighter and bomber pilots. They had to fly 35 missions while the Army Air Forces required only 5 missions to earn an Air Medal. Rotation homeward after 25 or 30 missions was out of the question for the Cub pilots.

In fact, the U.S. Third Army compiled figures which stated that its Cubs flew 87,002 missions during the European Campaign. These missions totaled 93,933 flying hours, of which 22,865 were fire missions, and 31,191 hours were reconnaissance and patrol missions. The rest of the flying hours were spent flying supplies, blood plasma and some replacements to front line and/or beleagured units.

The Third Army observation airplanes also flew some medical evacuation missions. General George Patton in March 1945, planned to use about 100 Cubs to transport a battalion of his troops across the Rhine to secure a railhead and jumping-off spot into Germany. However, on 7 March, American troops surprised German defenders at the Ludendorff railroad bridge, at Remagen, Germany, and secured the bridge long enough to prevent its demolition by the Germans, and moved troops across to the bridgehead. This success precluded Patton's having to resort to his plan to use the Cubs as a means of ferrying troops. Whether or not Patton's plan to ferry troops by air across the Rhine would have succeeded without massive fighter cover and support is a rhetorical question, which fortunately never had to be addressed.

Organic Army Aviation in Europe during the fall and winter campaigns of 1944-1945

As the Allied Armies moved across Europe in the fall of 1944, they encountered stiff and protracted enemy resistance. Ironically, many German units facing American divisions in the Lorraine Campaign of 1 September 1944 to 20 December 1944, were the Halbsoldatan ("Half-soldier") who were over-aged or second echelon troops. Most of the crack German units were on the Eastern Front.

The enemy eventually lost 5,000 square miles of territory to the American armies by the end of the campaign. The Americans moved inexorably closer to Germany. However, the enemy and the onslaught of bad weather cost the Allies—particularly the Americans—in time, men and materiel.

From September to December of 1944, Central Europe was beset by inclement weather. Army observation aircraft had difficulty flying spotter missions for the artillery. L-4s carried no navigational equipment, so the Cub pilots at times flew literally by the seat of their pants trying in the fog to locate targets of opportunity for division artillery. L-4 pilots would do such things as shut off their engines, and listen for the sound of vehicle or tank engines, and then call in artillery fire. To what extent "blind firing" was successful is not known. The observation plane crews, however, did have a large measure of success in calling in supporting fires during the Lorraine Campaign. Captured German documents attested to this fact by noting how effective American artillery was when aerial observation aircraft supported Field Artillery missions.

The German Ardennes Forest offensive of December 1944, served to illustrate further the limitations of aircraft operations in a war zone, due to weather conditions. The enemy offensive almost succeeded in driving a wedge in the American sector of the battlefield because of the element of surprise, enhanced by fog, snow and faulty Allied intelligence.

Aerial observation, along with tactical air support, came to a halt. It could be said that the bad weather was the "king of the battle" for about 3 weeks. Decisive enemy counterattacks drove Americans from their forward positions into areas such as Bastogne—known for its determined defense by its American defenders. Tactical air support, long an important part of the successful Allied drive across Europe, was unable to get airborne to bomb German infantry, armor and supply units until 24 December 1944. Organic Army Aviation suffered the same fate. In fact, the Allied tactical air forces were generally better off than the Army observation aircraft, because most Allied airfields were farther west and south of the Ardennes or in England. The L-4s were contiguous to the division artillery areas which in the Ardennes were mired in deep snow.

Where movement on roads or fields was not hazardous, L-4 crews and mechanics installed skis on their airplanes to facilitate takeoffs and landings in snow. American ingenuity ostensibly won out. When the inclement weather abated on Christmas Day of 1944, some L-4s got airborne and directed the laying down of effective barrages against enemy units.

In January 1945, the Allies once again began their move toward Germany. The German offensive in the Ardennes had spent itself. Germany no longer could do anything but maintain a defensive posture, and fight to the inevitable end.

Aerial observation in the battle zones was renewed vigorously as the skies cleared over Belgium and Germany. Once again, L-4s and L-5s were busy calling in artillery fire against the retreating enemy as Allied units began moving toward the historic Rhine River in February 1945. During the months of January and February, there were few encounters with German aircraft by observation planes. Allied tactical aircraft fairly well controlled the skies, so the Cubs were relatively unencumbered in their missions.

However, after American units crossed the Rhine on 17 March 1945, German aerial activity increased. Taking advantage of periods when Allied aircraft were absent, enemy aircraft strafed Allied concentrations of men and equipment, and made a concerted effort to shoot down American artillery observation planes. German fighter aircraft shot down eight L-4s in 3 days from the 24th to 27th of March.

The Final Operations: April and May 1945

The spring of 1945 brought the final phase of the European War. Enemy units were surrendering all along the battle line. One L-4 pilot had the unusual distinction of accepting the surrender of 300 armed German troops near Wurzen, Germany, on 23 April 1945. Captain Kenneth A. Morris was flying an L-4 when he observed a large column of troops moving near Wurzen. At first he thought it was a Russian column, but when he flew low over the road, the men in the column began waving white flags. When Captain Morris landed his plane he was immediately surrounded by 300 armed enemy troops and several British prisoners. The Germans wanted to surrender to him. He made arrangements for them to continue toward Allied lines to surrender.

As the European campaign came to a close, the L-4s and L-5s took on new missions such as guiding enemy units to points of surrender, ferrying staff officers throughout the battle area, helping direct artillery fire against pockets of resistance and serving as courier aircraft. Possibly when American soldiers came into a German town, it was not unlikely for them to see an L-4 pilot and observer sitting under the wing of their aircraft having a cup of coffee and smoking a cigarette! What a glorious way to end a war!

The Germans officially surrendered to the Allies on 8 May 1945. Much is owed to the men who flew the L-4s and L-5s over Europe from D-Day to V-E Day. They were the forerunners of our contemporary Army Aviation Branch. They served not only their country but also Army Aviation. Today there are few of these proud warriors left. They flew their seemingly flimsy aircraft with few, if any, technological innovations and in all kinds of weather.

Not enough has been recalled of their exploits, though thousands of GIs in Europe owed their lives to "these daring young men in their flying machines." These aviators at times did what was thought to be a tedious job lacking in glory. Their job was dangerous and many of these young men made the supreme sacrifice for their country. There were no television cameras to record their exploits, no cheering crowds to pay them homage and few memorials to their valor. However, Army Aviation and our Nation is much the richer for what these men did in the skies over Europe from 6 June 1944 to 8 May 1945. We salute them.

Joint-Rear Battle

This is the fourth article in a series about projects being developed by the AirLand Forces Application Agency (ALFA). Created in 1975, ALFA's mission is to manage activities of the Air Force Tactical Air Command and the Army Training and Doctrine Command team efforts toward development of improved doctrine associated with future AirLand Battle operations. The first article of the series, "ALFA Agency," appeared in the March issue. It was followed by "Joint Attack of the Second Echelon" in April and "Joint Tactical Deception" in May. Copies of these can be obtained by writing to Editor, *U.S. Army Aviation Digest*, P.O. Box 699, Ft. Rucker, AL 36362-5000, or by calling AUTOVON 558-6680.

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ALTHOUGH THE Army has Field Manual 90-14 and the Air Force has Air Force Regulation 206-2 as rear battle documents, there is currently no "joint" document that helps the joint task force commander and his staff plan and execute the rear battle.

Moreover, there is no defined command and control structure for the rear battle that adequately combines and directs the efforts of all U.S. rear battle units or elements, along with appropriate host nation support forces.

AirLand Forces Application Agency's (ALFA's) Joint-Rear Battle (J-RB) is a triservice program that was started to address these areas.

In mid-1983 Tactical Air Command (TAC) and Training and Doctrine Command (TRADOC) began talks on the ground defense for air bases. This dialogue soon expanded to address other rear area issues. By September 1983 the Joint Actions Steering Committee (JASC) had identified these additional areas of concern for rear area defense, including rear area close air support command and control for rear area operations centers and tie-in of host nation support.

At the same time commander in chief, Readiness Command (USCINCREDCOM) was also becoming keenly interested in the U.S. ability to defend its rear area. Realizing there were many causes for concern in a rear battle, in January 1984 USCINCREDCOM made rear area protection a major area of interest for future REDCOM exercises, in order to evaluate and address these concerns.

The JASC recognized the need for a "joint" rear area protection concept. In July 1984 the JASC formally tasked ALFA to manage the development of the concept, which should include the appropriate rear area related issues of the Army and Air Force Memorandum of Agreement.

ALFA scheduled its first meeting of the joint working group for 30 and 31 October 1984; 12 to 15 individuals would develop a scope and structure for the program. ALFA transmitted a message "advertising" this meeting to a limited number of "action" addressees and a large number of "info" addressees. Field interest was so high, however, that a large number of information addressees as well as the action addressees responded that they wanted to participate in the meeting. The first working group, grew from the original 15 attendees ALFA envisioned to 58, with worldwide representation.

Many of the working group members had a great deal of experience in numerous rear battle related issues. ALFA, therefore, requested that these participants provide briefings in their areas of expertise, in order to update the entire group on worldwide rear battle concerns as well as to provide insight on recent progress made on several of the rear battle related initiatives. These briefings filled the first day's agenda.

On the second day, the meeting broke into four groups. One group worked with joint force commander concerns, one with land component com-

mander concerns and one with air component commander concerns. The fourth group worked to incorporate rear battle related initiatives stemming from the Army and Air Force Memorandum of Agreement.

By the end of the initial 2-day session the group had determined the project's scope and structure.

The completed document which comes out of the project will address general rear battle doctrine and a rear battle command and control system. The document also will provide a framework for combining the many efforts now under way in all services to secure the rear area, including the rear area related initiatives in the Army and Air Force Memorandum of Agreement. Finally, the document will be nontheater specific, allowing worldwide application.

The working group arrived at several other conclusions during the initial meeting.

One of the first challenges was perhaps the most basic: name the project. The overriding consensus was to name the project Joint-Rear Battle (J-RB), since the group felt the term "rear battle" encompassed more of the issues involved in the rear area.

The group determined that the project's final document should be closely aligned with TRADOC's FM 90-14.

Host nation support can vary significantly from theater to theater, but the United States Army, Europe representative's briefing emphasized how important that support can be in our rear area. It also pointed out that dealing with host nation forces can be very complex, and requires extensive peacetime negotiations and planning.

All the group members agreed that the rear area operations centers (RAOCs) are the key to command and control in the rear areas. The necessary liaison for effective and timely command and control of U.S. rear battle areas and host nation support will take place continuously at these RAOCs.

The group also identified several areas for concern:

- First, the group consensus was that joint intelligence support and dissemination necessary for the rear battle was insufficient for the lower echelons. The existing system does not allow for adequate downward flow of information, and does not provide for an upward flow of information. For example, there are no defined channels for upward flow of intelligence data collected by such sources as security police patrols.
- The group also determined that protection of seaports — a vital link in our mobilization lifeline — needs much more attention.
- The last major concern the group noted was the RAOCs. While the RAOCs are key to command and control of rear battle assets, including host nation support, they are currently undermanned. Reserve forces man RAOCs, so they enjoy full manning under mobilization. However, because of the complexity and importance of planning and preparing for the rear battle, the group felt it was essential that RAOCs be adequately manned during peacetime. This will allow proper development of war plans, coordination with allied nations and U.S. rear battle elements, and appropriate evaluation in major training exercises.

After this initial meeting ALFA briefed the JASC on the status of the J-RB project. The JASC then instructed ALFA to structure the final pamphlet in 12 chapters. Chapter I will contain general RB doctrine. It will also provide a generic rear area structure (boundaries), and will discuss levels of threat and host nation support. Chapter II will discuss the threat forces and their capabilities, including threat "targeting" of friendly assets. Chapter III will cover J-RB command and control; intelligence; and operational considerations and responsibilities of the joint force, Army, Air Force and Marine Component commanders.

Chapters IV through XII will describe the joint force and uniservice command and control; communications; and intelligence requirements and responsibilities for the various issues and concerns of the rear battle. The chapters numbered as below will address these topics:

Chapter IV, Rear Area Operations Centers
Chapter V, Point Air Defense
Chapter VI, Counter-Helicopter Assault
Chapter VII, Air Base Ground Defense/Installation Defense
Chapter VIII, Rear Area Close Air Support
Chapter IX, Countering Tactical Missiles
Chapter X, Ground-Based Electronic Combat
Chapter XI, Engineering Support
Chapter XII, Host Nation Support

Since the initial joint working group meeting TAC, TRADOC and Marine Corps Development and Educational Command have identified appropriate chapter offices of primary responsibility. These bodies have provided ALFA proposed outlines for their areas.

On 26 and 27 March 1985 there was a second joint working group meeting, which consolidated OPR input and made a final determination on the content, structure and milestones of the J-RB pamphlet.

Watch the *Aviation Digest* for the next article in the ALFA series: "J-Fire."

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FROM THE GROUND UP

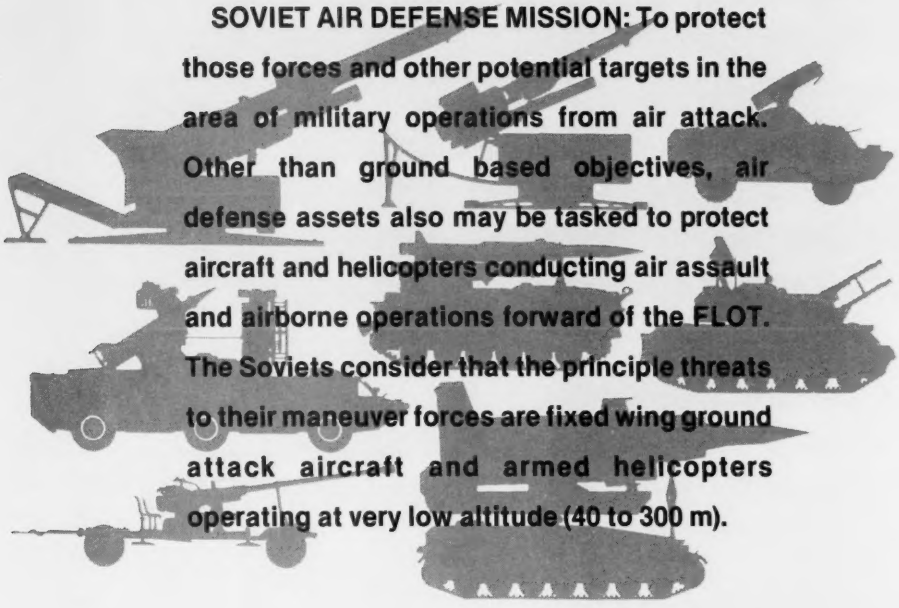
It's 0500. As commander, your original fire support mission has changed.

You now must conduct an attack on a threat forward area refueling and rearming point (FARP). Intelligence states that there are two squadrons of Hind and one squadron of Hip helicopters undergoing hasty fuel and munitions uploads. Final flight checks are made, and all Apache attack crews are ready for immediate takeoff. Terrain information gives the location of a small ravine area refueling and rearming point (FARP). Intelligence prior to the target area. With all helicopters now airborne, confidence and morale are high.

Being commander, the full picture of your responsibility is apparent as you think of your crews and the total armament payloads you presently have. Knowing the training that all the crews and you have gone through, your skills are at their best to exact a tremendous loss from the enemy. The time remaining to the target is 10 minutes. Trigger fingers are itching. There are no apparent radar lock-ons so all seems well to the target area.

High priority was placed on this mission and with its single success a major breakthrough by blue forces could be attained. Predetermined egress routes have been established and all systems are armed for fire. The time has now arrived, as all helicopters enter the ravine area and are given final instructions with 2 minutes to the target. As the exit to the ravine approaches everyone is mentally geared for optimum performance. Just as you are exiting the ravine area and are at the desired engagement range, you sight two Hind gunships firing air-to-air missiles from an 11 o'clock position, about 50 meters high. You saw the smoke as the missiles were fired but you lost sight of them. Fortunately, you are able to activate countermeasures by using flares to avoid being hit.

As soon as possible, you acquire the Hinds for targeting. You're able to fire several missile rounds at the evading Hinds and then follow them to assure target kills. Midway in your pursuit, you start receiving small arms fire and what looks like SA-7 surface-to-air missiles (SAMs) close to your area. No time to waste! The Hind targets are going down so you return to the original mission. You approach the FARP area and the desired targets, exacting fire as quickly as possible. Tremendous explosions start erupting throughout the


SOVIET AIR DEFENSE MISSION: To protect those forces and other potential targets in the area of military operations from air attack. Other than ground based objectives, air defense assets also may be tasked to protect aircraft and helicopters conducting air assault and airborne operations forward of the FLOT. The Soviets consider that the principle threats to their maneuver forces are fixed wing ground attack aircraft and armed helicopters operating at very low altitude (40 to 300 m).

Hind and Hip area as the deadly rounds hit their mark. You know now that all your training has just paid off. The 30 mm cannon and 2.75 inch rockets did exactly as they were intended to do.

On the return home, you have radio contact with 3 of the remaining Apache attack/scout crews. The fate of the other crews and helicopters remains unknown; returning for a search mission was utterly impossible. Every air defense weapon in the area was being fired. Radars were locking on and SAMs were filling the skies as we made a beeline to home base.

This story, even though fictional, offers a likely scenario that aviators could find themselves in when a future conflict arises. Soviets have been known to mass fires of varying kinds in order to maximize the chance of kill. In the above scenario, surprise and not being detected are some of the keys to victory over Soviet air defense. As flying targets enter the engagement zone of an air defense net, especially helicopters, they can expect everything from bullets to heat seeking and radar guided missiles in their area. Basically, the Soviet plan is to so completely cover an area, that *any* intruder will receive sharp resistance.

How do the Soviets plan to use air defense in an area of operation?

The Soviet philosophy about air defense is to create an all-seeing eye in an area of defense. The engagement of low-flying, nap-of-the-earth (NOE) attack helicopters is a high priority to the Soviets as they are a potentially great threat to their motorized rifle and forward based forces. Attacking helicopters will be engaged primarily by SA-7, SA-8, SA-9 SAMs. However, machinegun and small arms fire will also engage helicopters. All weapons fire will be maintained on incoming hostile helicopters even if engagement is premature. It's better to engage early and waste some munitions than to allow the hostile aircraft to deliver its ordnance at a desired target or targets (figures 1 and 2).

The Soviets have gone to great lengths to maintain the surveillance of surrounding airspace. They train their commanders to observe areas masked by trees and ridges and through use of these air observers the Soviets can provide initial warning of incoming aircraft. Each observer is given a sector of airspace to monitor. According to the Soviets, an aircraft can be detected at ranges of 2 to 7 km. However, these distances can be

	SA-6 Gainful	SA-7 Grail	SA-8 Gecko	SA-9 Gaskin
Range (km)				
Maximum	30	3.6/5.5**	12.5	6
Minimum				0.2
Altitude (m)				
Maximum	13,000	3,500/4,500**	6,000(est)	5,000(est)
Minimum	100	45	10	10
Speed (Mach)	2.5	1.4/1.75**	1.5(est)	1.5+(est)
Guidance Principle	Semiactive Radar Homing	Passive Infrared Homing	Command	Passive Infrared Homing
Warhead	HE	HE	HE	HE
Weight (kg)	80	2.5	16-18	2.5+
Fuse	Proximity	Impact	Proximity	Unk
Missile				
Length (mm)	6,200	1,500	3,200	1,800
Span (mm)	1,520	Unk	640	300
Diameter (mm)	335	70	210	110
Launch Weight (kg)	580	10	170	55
Propulsion				
Booster	Integral Solid, Ram-Jet	Solid Solid, Boost-Sustained	Solid	Solid
Sustainer			Solid	Solid
Missiles per Launcher	3	1+?*	4/6***	4+4*
Associated Radars	Long Track, Straight Flush, Thin Skin	N/A	Land Roll, Long Track, Thin Skin, Possible Flat Faced	N/A
Date of Operational Inception	1970	1969	1974	1968

*Additional missiles carried in vehicle
**SA-7A/SA-7B
***Six missiles in canisters on some versions

FIGURE 1: Surface-to-air missiles.

affected by terrain and early morning fog. Aided by the use of binoculars, detection range can increase to about 12 km, which provides an effective visual surveillance and first warning of enemy air attacks.

To assure the highest possibility of kills, Soviet commanders will determine the sectors where small arms fire, vehicle-mounted antiaircraft machineguns and possible antitank guided missiles (ATGMs) are to be employed. ATGMs can be used to engage troop-carrying and armed helicopters. The thought of being engaged by an ATGM is relatively new to aviators, but should be given considerable thought, especially by those aviators flying NOE. In coordinating all the above, it should be noted that Soviet air defense commanders will rely heavily on radar visual signals and field communications: These are the initial primary means of successfully defeating incoming enemy aircraft.

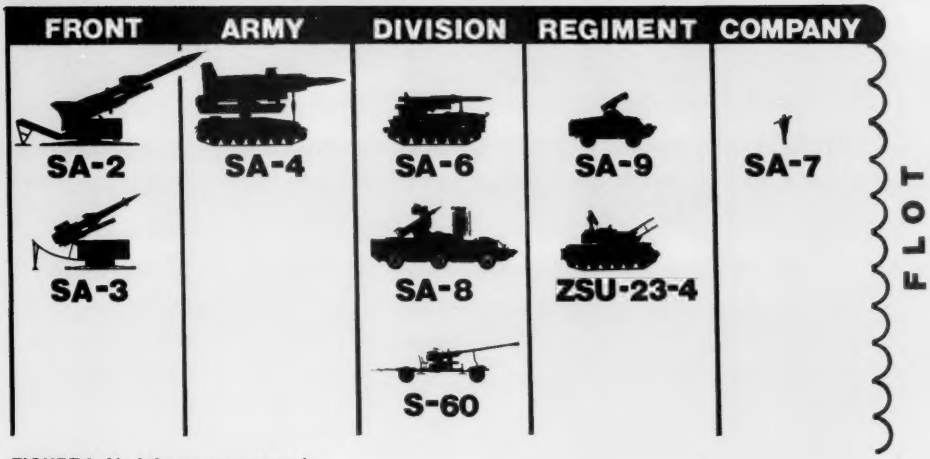


FIGURE 2: Air defense weapons mix.

Soviet air defense weapons

The Soviets have a variety of air defense missiles, guns and support equipment at almost every level of organization (figure 3). In recent years new technologies have been incorporated into new weapons systems for air defense and existing systems have been upgraded. The following is a list of air defense systems that could be used for defense of a typical Soviet army: (Systems after the slash (/) are proposed follow-ons.)

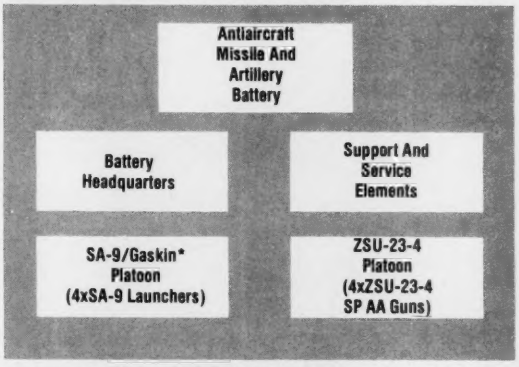
- ZSU-23-4/ZSU-X
- SA-9/SA-13
- SA-8/SA-15
- SA-7/SA-13
- SA-6/SA-11
- SA-4/SA-X-12

These weapons provide a large engagement envelope which could impact greatly on an enemy's limited range and standoff weapons.

In maintaining defense of their own forces, air defense batteries relocate as necessary to provide continuous and effective protection to a supported unit. Soviet commanders maintain effective protection by leaving at least one battery in a firing position to cover others that are relocating. Air defense elements belonging to maneuver units usually move as a permanent member of that unit (figures 4 and 5).

The Soviets believe that intense, sudden ground fire from an unexpected location or direction can be highly effective in destroying attacking aircraft. It is their belief that such fire can seriously degrade aircrew performance and cause them to abort their mission. Also, the Soviets think that ambushes and roving air defense units can make the enemy believe that significant air defense elements are located in areas where there are actually only a few weapons. Air defense units would use these tactics to cover gaps in air defense; provide coverage on less likely approach routes; deceive the enemy about the disposition of other air defense assets, and when present assets are thought to be inadequate.

FIGURE 3: Regiment air defense battery.


Antiaircraft Missile And Artillery Battery
Battery Headquarters
Support And Service Elements
SA-9/Gaskin* Platoon (4xSA-9 Launchers)
ZSU-23-4 Platoon (4xZSU-23-4 SP AA Guns)

Radars: Gun Dish Fire Control (ZSU-23-4 Only)
*May be replaced by SA-13s in some units.

Surviving the Soviet air defense

The Soviet Army has one of the best tactical air defense networks in the world. Guidance and fire-control methods for Soviet air defense weapons include aided optics, acquisition and tracking radars, infrared seekers and laser-rangefinding equipment.

Theoretically, any of the Soviet air defense weapons have the potential to engage and destroy helicopters if survivability measures are not employed by the helicopters. The following are some survivability measures that could be employed:

- Deny and degrade enemy observation
- Deceive target acquisition
- Disrupt missile guidance systems
- Destroy weapons systems.

Today's survivability equipment available for Army helicopters includes radar warning receivers, radar jammers, infrared jammers, flare and chaff dispensers to degrade infrared or radar weapons; additional items that should be available are laser warning receivers and missile approach detectors. Helicopter mounted weapons systems have progressed far beyond the Vietnam era door guns and first generation free-flight rocket systems. Not only ballistic weapons (guns, cannon and rockets) but also precision-guided munitions make the fighting helicopter a formidable threat to a multitude of targets on the modern battlefield.

Possible weaknesses in Soviet air defense

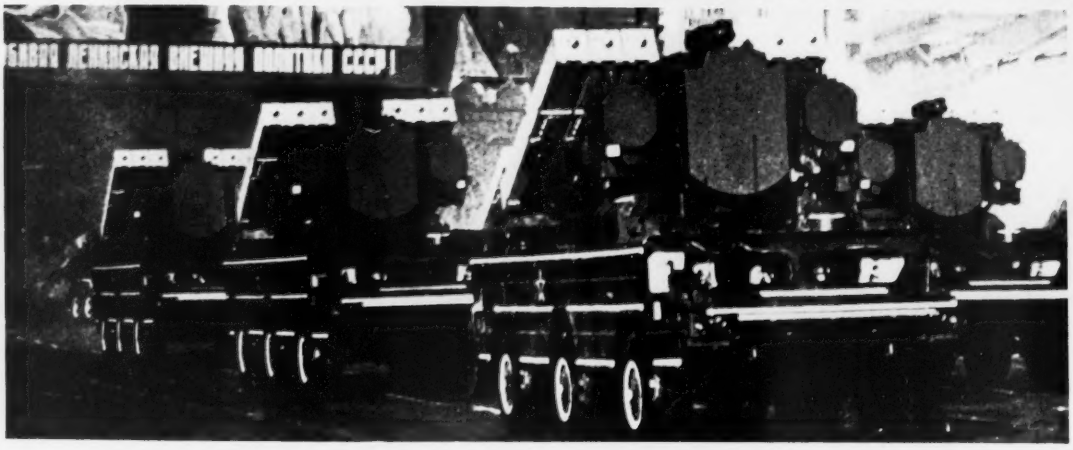
As previously stated, the Soviets realize the great potential threat of present Western armed helicopter systems, especially one such as the AH-64 Apache attack helicopter. The more versatile, responsive and survivable our helicopters become, the more concerned the Soviets will be with the division of airspace among the many weapons systems they have available. This variety of weapons does present the Soviets with a potentially great weakness—that being *command and control.*

Because of the requirement to provide for all the inherent needs of air defense as the maneuver regiments move forward, the air defense commander could easily run into the problem of keeping pace with the maneuver forces. Supply, equipment and ammunition loads would have to be resupplied after initial usage of basic load. If air defense weapons are not in place when required, Soviet tanks and motorized rifle units could become exposed to enemy ground attack aircraft and armed helicopters: This could be the primary reason for major losses.

Doctrinally, the Soviets envision a continuous operation with no gaps, moving operations one behind the other and in effect placing a greater responsibility on the covering force of air defense. Additionally, criticisms have risen in Soviet literature of maneuver units failing to recognize air defense as a primary element of combined arms combat. Many times commanders have forgotten about the air threat and have failed to employ their air defense assets effectively. The one thing about these probable weaknesses—the Soviets know about them.

To correct these possible failings, the Soviets will have to train their commanders in the integral workings

FIGURE 4: Each of the 20 Division Air Defense Regiment SA-8 Gecko transporter erector launchers is a self-contained fire unit.



of air defense on a more collective and focused method to avoid such weaknesses in a fast moving conflict. The Soviets, no doubt, could presently provide an air defense that would provide adequate coverage during an operation. These problems in themselves will not necessarily degrade the effectiveness of air defense, but if left unattended would surely be detrimental during extended operations.

Summary

Soviet air defense, when viewed through the eyes of the intelligence community, remains a formidable threat to *any* air enemy in spite of existing weaknesses. The Soviets continue to make quantitative as well as qualitative improvements in overall air defense effectiveness. The combination of SA-6 and SA-8 SAMs, and their greatly improved follow-on systems, will give the Soviet ground forces a comprehensive, overlapping air defense system. As a whole, the Soviets are unmatched numerically by any other military force in air defense weapons. They have the capability and firepower and continue to improve air defense organizations and their ability for quick response.

The information presented is given in an effort to make the reader aware of some peculiarities in Soviet air defense. Not all systems are perfect, and with the Soviets' view of the modern battlefield, the next war will be a high paced, furious confrontation. The intent of this article is to provide the reader with some basic thoughts concerning aviators and Soviet air defense against helicopters.

FIGURE 5: A platoon of four ZSU-23-4s is organic to motorized rifle and tank regiments.

VHIRP
Clarified

The Army Aviation Policy Committee has asked the U.S. Army Air Traffic Control Activity to further clarify vertical helicopter instrument flight rules recovery procedures (VHIRP) to both Aviation commanders and Army aviators. This article is one effort to accomplish this; others include a revision of AR 95-50 to provide more detailed guidance; the development of a handout for the Army Aviation Commanders' Course; more detailed presentations at Air Traffic and Airspace (AT&A) Officer Educational Seminars; and the provision of more guidance to Aviation commanders from the Department of the Army Regional Representatives and the DA AT&A officer.

VERTICAL HELICOPTER instrument flight rules recovery procedures—VHIRP. What is it? Who is required to have one? How is it developed and established? When is it activated? Can the requirement for one be waivered? What specific restrictions apply? These and other questions will be answered by this article. If you know the answers to the above questions then you have no need to read further.

Issue No. 100 discussed at the 1984 Army Aviation Policy Committee Meeting contained the following question—"Does the Army have a valid requirement for VHIRP?" After considerable discussion it was determined that we do indeed have a valid requirement; however, the discussion also revealed that the vast majority of aviators and Aviation commanders do not know the answers to the questions in the above paragraph. As a result the committee tasked the Army Aeronautical Services Office (ASO) to correct this situation.

First, there seems to be a misconception by many Army aviators that the Federal Aviation Regulations (FARs) do not apply to the military pilot. This is not true. Military pilots must comply with the FARs just as civilian and commercial pilots do. Granted, there are certain parts of the FARs that do not apply to military pilots. Also in certain instances the Army has requested and has been issued waivers and exemptions from certain FAR procedures and requirements. Finally, deviation by military aircraft from the FARs may be authorized because of a military emergency or urgent military necessity.

Did some say—"FARs do not apply to aircraft

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operating in restricted areas?" Not true! Some portions of the FARs apply to operation in restricted areas as well as other types of special use airspace. FAR Parts 73 and 91, as implemented by Federal Aviation Administration (FAA) Handbooks 7110.65, "Air Traffic Control"; 7400.2, "Special Military Operations," are the primary FAR Parts that apply. Additional information is contained in Army Regulations 95-1 and 95-50.

Before getting into the details of VHIRP there are a few terms and definitions that you should be familiar with to ensure we understand each other. The following are provided for your information:

• *VHIRP (Vertical Helicopter IFR Recovery Procedures)*—Those procedures developed for the safe recovery of Army helicopters from instrument meteorological conditions (IMC) encountered during visual flight rules (VFR) tactical terrain flight training.

• *Tactical Terrain Flight Training*—The term applied to the three phases of the Department of the Army (DA) tactical flying program. These are low level, contour flying and nap-of-the-earth (NOE).

• *Tactical Terrain Flight Training Areas*—Areas where the tactical terrain flight training is conducted.

• *MARSA (military assumes responsibility for separation of aircraft)*—Applies to the separation of military aircraft from each other.

• *Recovery Airfield*—The airfield designated in the VHIRP to which the helicopter will recover should IMC be encountered during tactical terrain flight training.

• *Recovery Fix*—The location normally designated by altitude and geographical coordinates or description, to which the aviator will proceed and where he expects to receive an air traffic control (ATC) clearance and enter the ATC system.

• *Instrument Flight Rules (IFR) Reserved Altitudes*—Those IFR altitudes that will be kept free from normal IFR operations by the FAA facility during periods when the VHIRP is activated.

• *Preplanned Routes*—Those routes established to permit the aviator to navigate from the recovery fix to a designated airport or landing area in the event of loss of communication or inability to contact ATC during an actual VHIRP.

• *Intermediate Holding Fix*—A fix, normally designated by altitude and geographical location, established for the purpose of providing separation between military aircraft in the event two or more aircraft are involved in a VHIRP in the same area at the same time. MARSA applies in this instance since FAA is not reponsible for separation of aircraft until an ATC clearance has been given, acknowledged, and the aircraft is being provided guidance by the ATC facility.

OK, now for the VHIRP itself. What is it? What is it for? Who is required to have one? How is a VHIRP developed? What are the special requirements and considerations? When is it activated? How about waivers to the VHIRP requirements? What is DA policy concerning use of a VHIRP?

• **What is a VHIRP?** It is an emergency procedure, right? Wrong! It is not! It is a nonstandard operating procedure that has been previously coordinated with, and approved by, an FAA ATC facility. It is a contingency plan to be executed as

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a last resort after exhausting all safe efforts to maintain visual meteorological conditions (VMC) to include landing as soon as possible.

• **What is the purpose of a VHIRP?** It is designed to permit the safe recovery of Army helicopters that may encounter (IMC) while conducting VFR tactical terrain flight training. Properly developed a VHIRP will have minimum impact on the ATC system and will allow the aviator to recover to a designated recovery airfield or other point of landing without being in violation of the FARs.

• **Who is required to have a VHIRP?** *Only* those units, activities, or installations that, as part of their mission, conduct tactical terrain flight training have a requirement to develop a VHIRP. *If there is no tactical flight training mission there is no VHIRP requirement.*

• **How is a VHIRP developed?** The commander, having a requirement for a VHIRP, will attempt to develop it in consonance with the appropriate ATC facility and the Department of Army Regional Representative (DARR). See AR 95-50 to determine which DARR is responsible for your geographical area.

Step one is the establishment of a tactical terrain flight training area. This is required by FAA. This area may be located inside or outside the boundaries of a military reservation. It is established in much the same way as NOE courses except that it must be coordinated with the appropriate FAA ATC facility. This coordination is required to ensure that sterilized airspace can be provided if needed. The location of the recovery fix will influence where the recovery fix and any intermediate recovery fixes are established. By having a specified training area, procedures can be developed for aviators to use in avoiding known obstacles while climbing to the recovery fix from the point where IMC is encountered.

Step two is the establishment of a recovery fix and intermediate recovery fixes as necessary. The recovery fix is the point to which the aviator is expected to proceed after encountering IMC. It is also the point where the aviator expects to get his ATC clearance. If more than one aircraft may be involved at a time, then intermediate recovery fixes should also be established. MARSA is in effect when two or more aircraft are involved at the same time. FAA is not responsible for applying separation criteria to any of these aircraft until the pilot has received an ATC clearance and has departed the recovery fix.

The third step is the selection of the recovery airfield or other point of landing. Of course, the recovery airfield must have the appropriate terminal instrument procedures that will permit the safe recovery of the aircraft. It must also be within the fuel range of the aircraft.

The fourth step is the development of a Letter of Agreement (LOA) between the Army activity and the ATC facility. The letter will be coordinated with the DARR prior to being signed off and will include as a minimum:

- Geographical coordinates of the tactical terrain flight training area.
- Identification of using unit(s).
- Scheduled times of use—if known.
- VHIRP activation procedures.
- IFR reserved altitudes.

• Recovery fix and intermediate fixes as required.

• Preplanned routes—as required.

• Designated recovery airfield or other point of landing.

• Lost communications procedures.

• Transponder code setting.

• Specific procedures concerning when MARSA ends and ATC assumes the responsibility for separation of aircraft.

Weather conditions. Because of wide variations in climate and terrain, weather conditions that require the activation of a VHIRP have not been specifically stated. They should be clearly spelled out in your LOA, taking into consideration the type of terrain, normal weather patterns, the location of the training area and recovery fix, the location of the recovery airfield, and the terminal instrument procedures at the recovery airfield.

Activation. A VHIRP will be activated only to accommodate tactical terrain flight training. It will be activated in accordance with the procedures contained in the LOA.

Commanders' responsibility. Prior to authorizing tactical terrain flight training to be conducted, commanders must be aware of weather conditions; whether IMC is likely to be encountered during the training period; the instrument proficiency of his aviators; and, what IFR equipment is in his aircraft and its operational status. *Commanders should also consider how urgent the training requirement is when IMC is likely to be encountered.* Should the decision be made to proceed with training when IMC may be encountered, then the VHIRP should be activated prior to entering the training area. Commanders must also consider the weather at the recovery airfield. If the weather there is below, or forecast to be below, minimums for the procedure prescribed for the VHIRP, then training should not be authorized. An approved VHIRP does not include authorization to descend below established minimums for an instrument procedure.

Waiver. A waiver to the VHIRP requirement will be granted by the major Army command (MACOM) when the DARR or the DA AT&A officer cannot, through negotiations with the appropriate ATC facility, establish a recovery fix or other means that permit the aircraft to enter the ATC system. If this occurs, the director, USAATCA-ASO, will forward a letter to the MACOM stating this fact. The MACOM will use this letter as a basis for issuing a waiver.

In addition to the above, installation or activity commanders should submit requests for waivers to their MACOM when:

• The unit or activity is geographically located where weather is not a factor.

• Location of the tactical terrain flight training area is such that the fuel range of the helicopters would prohibit their recovery in the event IMC should be encountered.

• Approved operating procedures or directives (unit standing operating procedure) prohibit tactical terrain flight training in weather conditions when IMC might be encountered.

Commanders should be aware that a waiver of the VHIRP requirement does *not* authorize flight below the minimums provided for in the FARs or in AR 95-1. It means that training will not be

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conducted during those times when IMC is likely to be encountered. It also means that the unit will not be marked down on the Aviation Resource Management Survey team inspection.

DA policy. It is DA policy that:

- Operating in IMC is authorized only when operating on an approved IFR flight plan or when executing an approved VHIRP.
- Commanders will not permit tactical terrain flight training to be conducted when IMC is likely to be encountered unless an approved VHIRP exists and it is activated for the duration of the training or until weather ceases to be a factor.
- Commanders will permit only current instrument qualified aviators, operating aircraft that are properly equipped, to fly IFR in the ATC system and the particular VHIRP developed for their training area; to conduct tactical flight training when IMC is likely to be encountered.
- Each VHIRP will be coordinated and approved by FAA on a case-by-case basis. It also will be coordinated with the appropriate DARR throughout all development stages.

Emergency IFR recovery procedure. Now that you know all about a VHIRP you may well ask, "What is an emergency IFR recovery procedure if it isn't a VHIRP?" Well, it is an *unapproved* procedure for all pilots, military and civilian, to use when they have encountered IMC while operating VFR. In this instance the pilot should set the transponder to the emergency code, contact ATC for a clearance as soon as possible, climb if necessary to avoid an obstacle, and avoid airways and other IFR routes to the extent possible until an ATC clearance has been received. The reason this is an *unapproved* procedure is because of its potential for catastrophic impact on authorized IFR traffic in the ATC system.

If for any reason you should be caught in the above situation you should elect to follow the above described emergency procedure even though it is unapproved. The good news is—if you follow this procedure chances are that you will save your life but will receive a violation from FAA. The bad news is that you may not save your life and you may cause the loss of other lives—those persons in an aircraft operating on authorized IFR flight plans.

The word to the wise is, "Don't be dead, plan ahead."

U.S. Army Class A Aviation Flight Mishaps

	Number	Flying Hours (estimated)	Rate	Fatalities	Total Cost (in millions)
FY 84 (to 31 May)	26	988,826	2.63	24	$45.0
FY 85 (to 31 May)	36	994,764*	3.62	27**	$62.6

*May 1985 Flying Hours estimated

**Excludes one non-DOD fatality

U.S. Army Information Systems Command
ATC ACTION LINE

SATELLITE NAVIGATION SYSTEM

The following is an excerpt from a DOD position paper which will be presented to the NATO Air Traffic Service Working Party in October 1985 and is provided for your information.

SINCE THE EARLY 1960s, the United States Navy and Air Force have pursued the idea that navigation and positioning could be performed using radio signals transmitted from space vehicles. Both services have sponsored extensive technology programs to demonstrate the feasibility of a Defense Navigation Satellite System (DNSS).

The Navy developed TRANSIT, now operational, and TIMATION. The Air Force conducted a series of studies for a navigation system called 621B. The basic principles of 621B were verified and on 17 April 1973, the Air Force was designated the executive service to consolidate the concepts of DNSS into a single Department of Defense (DOD) system. The navigational satellite timing and ranging (NAVSTAR) global positioning system (GPS) emerged as a combination of the best of the previous concepts and included Army and Marine Corps positioning and navigation requirements.

GPS is a space based navigation system that has the capability to provide highly accurate three dimensional position, velocity and time to an infinite number of equipped users anywhere on or near the earth. The system consists of three segments, space, control and user.

The space segment will consist of 18 satellites plus 3 active spares. The constellation is designed so that a minimum of four satellites are always in view. Satellites transmit a composite dual code signal—one for acquisition and course navigation and one for precise navigation. The signal contains satellite ephemeris information (computed location of celestial bodies), atmospheric propagation correction data, and satellite clock bias information. The dual L-band frequency transmissions permit the calculation of delays resulting from signal travel through the ionosphere.

The control segment consists of a ground level master control station located at Colorado Springs, CO, and five monitor stations at Hawaii, Colorado Springs, Ascension Island, Diego Garcia and Kwajalein. The master control station collects ranging data from the monitor stations and generates the navigation message to upload each satellite on a daily basis.

The user segment consists of a receiver processor, antennas, interface unit, harness and wiring, and a control display unit (optional). The family of receivers use common modules and consist of low dynamics 1 channel, medium 2 channel, and high dynamic 5 channel sets. The high dynamic set, for use in fighter type aircraft, will require signals from at least four satellites to maintain continuous three dimensional position and time.

The GPS will provide worldwide two dimensional navigation coverage exceeding TACAN capabilities in late 1987, and worldwide three dimensional coverage in 1989. The Federal Radionavigation Plan and JCS Master Navigation Plan document DOD policy to phase-out TACAN, LORAN and OMEGA and institute GPS as DOD's primary en route navigation and nonprecision approach aid by 1997. Both plans have recently been updated and approved by the U. S. Department of Transportation and DOD.

GPS will provide a broad spectrum of civil users with an accurate position, velocity and time determination at a reasonable cost. DOD has recently authorized a substantial increase in the accuracy of NAVSTAR signals to all civil users, who will now be able to determine position to within 100 meters. The DOD accuracy will be within 15 meters. The NAVSTAR GPS will enhance interoperability by allowing all participants to operate in a common, worldwide grid system.

Readers are encouraged to address matters concerning air traffic control to: Director, USAATCA Aeronautical Services Office, Cameron Station, Alexandria, VA 22304-5050.

painting by Robert C. Sherry

Your individual contribution of $100 entitles you to receive a set of 12 reproduced paintings of Army aircraft signed by the artists; and you also will become a life-time member of the Museum Foundation